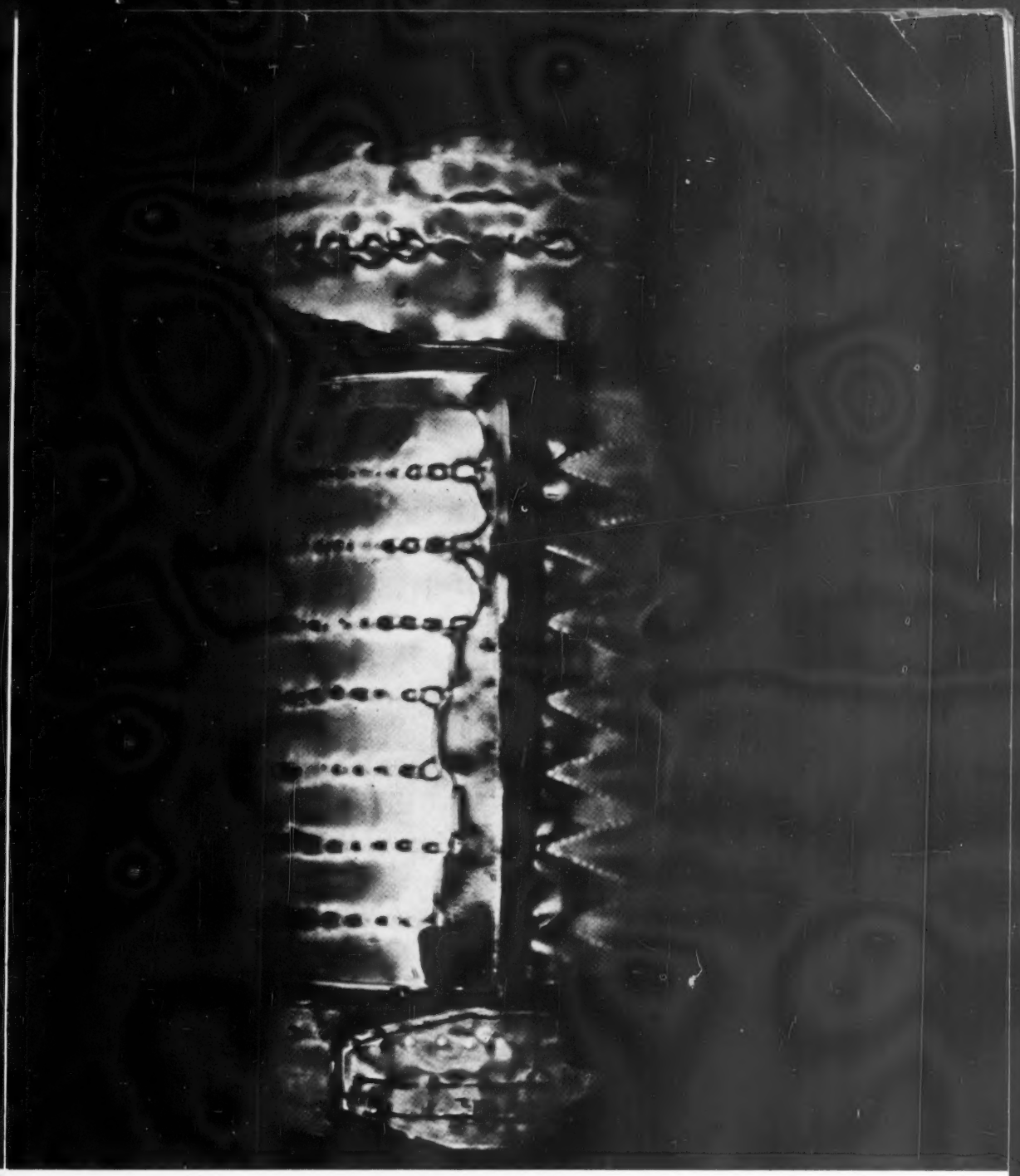
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
DECEMBER 18, 1961



With patterns like these on rocket pressure vessel, engineers find . . .

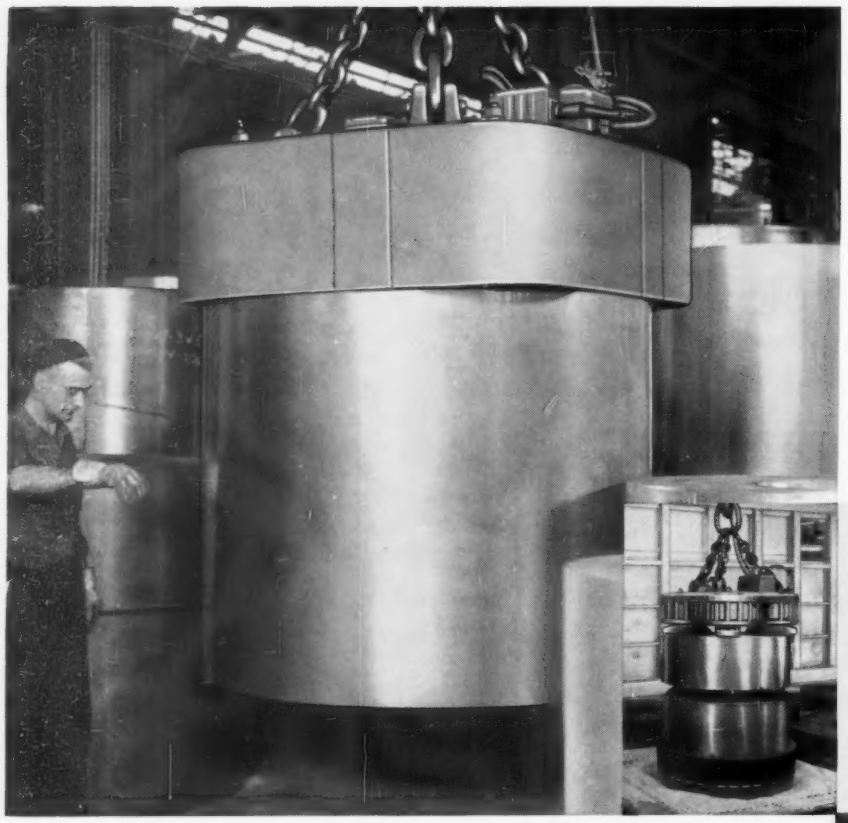
Color Tests Predict Performance . . . 127

Capital Spending Continues Uptrend . . . 85

PROGRAM FOR MANAGEMENT Here's Checklist for Profit Growth 95

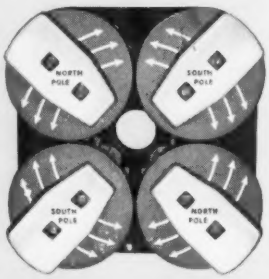
More Japanese Steel in U. S. Future? 169

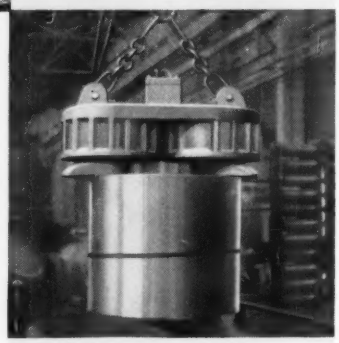
METALWORKING WEEK—PAGE 19
COMPLETE CONTENTS—PAGE 21



LIFTS THE COIL —NOT THE HOLE

Poles directly over coil wall give high flux density at each pole shoe contact.





Protect finished coil surfaces, Get better storage capacity *with*

EC&M type CSM Magnets

Exclusive Advantages of the CSM design:

1. Lifts coil without tilting — reduces chance of damage to bottom of coil when setting it down.
2. Nothing adheres magnetically to coil's bottom to damage it when it is again set down. Coil below is not disturbed when top coil is lifted from the pile.
3. Operator can center magnet on coil easily — magnet does not hide his view of the load.
4. Magnet can deposit coil in, or remove coil from, confined passages without disturbing surrounding piles or objects — minimum overhang allows compact storing.
5. Lifts coils weighing up to 80,000 pounds.

Type CSM Magnets are designed specifically to handle finished coils carefully and without delay. Coils are moved quickly and safely between roll stands and annealing furnaces, in and out of storage areas — and similar movements where protection of the finished product is paramount.

FOR A SPECIFIC PROBLEM, TELL US—

1. Inside and outside diameter of coil
2. Weight of coil
3. Gauge of strip
4. Type of coil (tightly or loosely wound)
5. How banded and how smooth on top (evenness of turns)

Ask for Bulletin 1312 which fully describes these magnets

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

7241

NOW TWO bolts do the work of THREE

new high-strength bolt saves one-third

It's no longer necessary to use one bolt to do the job of one rivet, as required by previous specifications for high-strength bolts. Recent changes, which now allow bearing-type connections, let the designer take advantage of the difference in strength between high-strength bolts and rivets. This permits the use of two new-type high-strength bolts where three old-style bolts were formerly required. The new bolt is also ideally suited for all types of friction connections.

The major redesign features are:

1. Larger head provides increased bearing surface.
2. Shorter thread length eliminates threaded portion of bolt from shear plane.

Another economical feature is the elimination of one of the two washers formerly required. And this one washer has a smaller outside diameter.

Steel

for Strength
. . . Economy
. . . Versatility

BETHLEHEM NOW STOCKS ALL SIZES

Ready for shipment, large and complete stocks of all sizes: diameters from $\frac{5}{8}$ to $1\frac{1}{4}$-in., inclusive, in all standard lengths. Get in touch with the nearest Bethlehem office for more information. Or write to us at Bethlehem, Pa.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, Bethlehem, Pa. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

UP TO TWICE AS MANY CUTS PER WHEEL

WITH BAY STATE'S NEW

HUSTLER

CUT-OFF WHEELS

This unretouched photo shows Bay State's HUSTLER cutting a straight, smooth slot with parallel sides. No sign of flutter while cutting because Bay State's HUSTLER resists bending even when it's deliberately twisted. Pebble-grain on sides of wheel insures free cutting action even in large-section cuts.

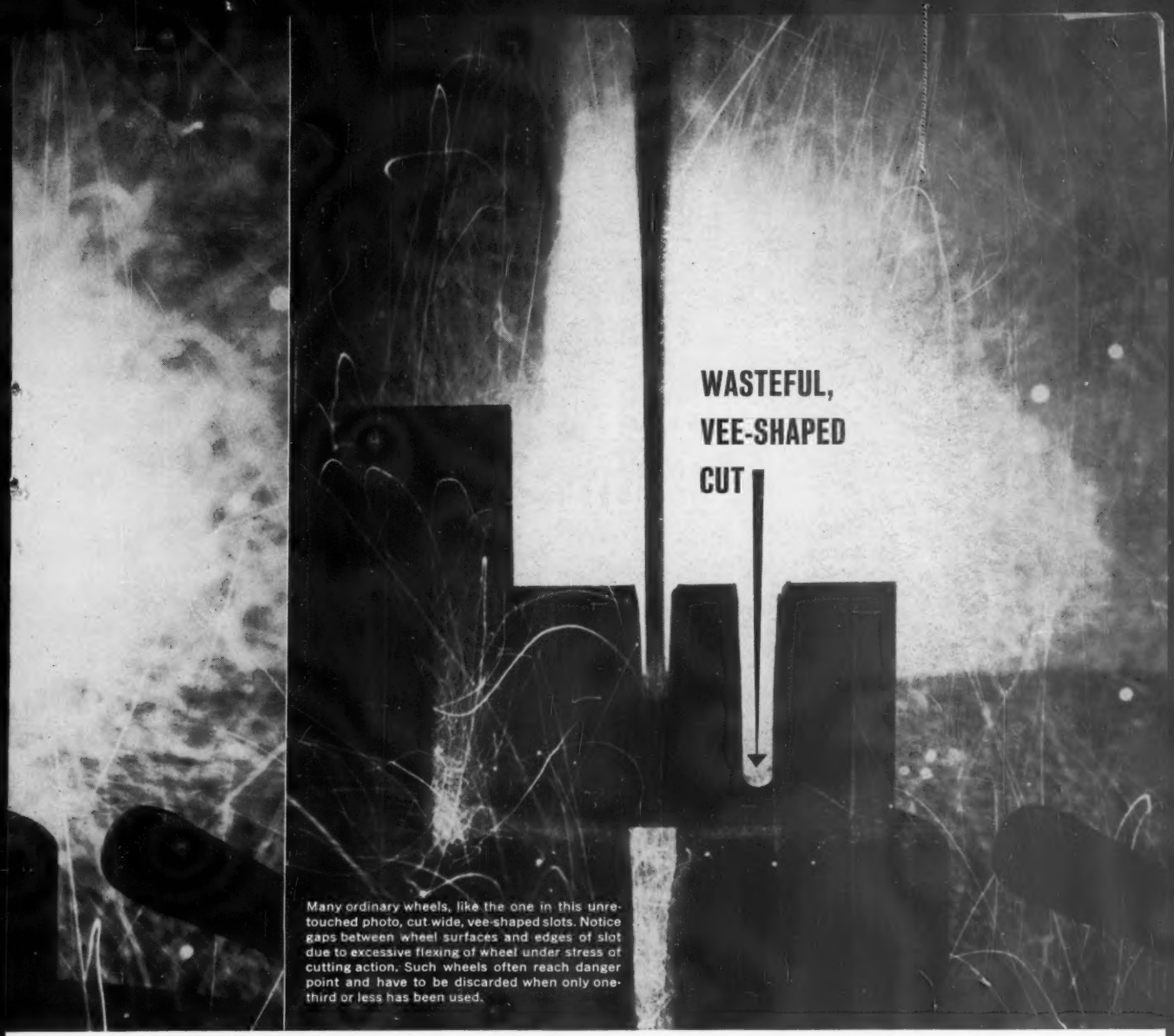
This is one of the most important developments in abrasive technology in the last five years. Even under brutal operating conditions, Bay State's new HUSTLER wheel has *proved* its ability to outperform ordinary cut-off wheels by as much as two-to-one. Longer life means additional economy because less down-time is required for wheel replacement . . . you do not have to throw away HUSTLER wheels before they are completely used.

Secret of the new wheel's phenomenal performance (see test results at right) lies in two exclusive characteristics developed by Bay State's R&D staff:

1. Extreme rigidity Entirely new bond formulation and reinforcement technique weld Bay State's HUSTLER wheel into a single, homogeneous unit so rigid it virtually eliminates fluttering. Rugged tests have proven its ability to resist chipping, shattering or delaminating.

2. Pebble-grain side surfaces Actual abrasive grain pebbles the side surfaces of this unique new wheel and keeps it cutting smoothly even when the wheel or the work is twisted or cocked.

BAY STATE



Many ordinary wheels, like the one in this unretouched photo, cut wide, vee-shaped slots. Notice gaps between wheel surfaces and edges of slot due to excessive flexing of wheel under stress of cutting action. Such wheels often reach danger point and have to be discarded when only one-third or less has been used.

TYPICAL CUTTING TEST RESULTS

1. STAINLESS STEEL	Sq. In. Wheel Used	Sq. In. Material Cut	Cost per Cut
"HUSTLER" WHEEL	66.7	65.0	$.0375
COMPETING WHEEL	83.8	65.0	$.0450
2. PHOSPHOROUS BRONZE	No. of Cuts	Time	Wheel Wear
"HUSTLER" WHEEL	20	13.2 sec.	1/16"
COMPETING WHEEL	20	10.5 sec.	7/16"

3. AIRCRAFT QUALITY STEEL The "Hustler"... "fastest cutting wheel ever used, and furthermore it made 84 cuts against 56 cuts by the best competing wheel."

4. CHROME STEEL	No. of Cuts	Wheel Wear
"HUSTLER WHEEL"	24	2-1/4"
COMPETING WHEEL	12	6-1/8"

THE HUSTLER cuts ferrous and non-ferrous materials such as: Aluminum, Brass, Bronze (including manganese and aluminum bronze), Cast Iron, Ductile Iron, Stainless Steel.

Write for free Technical Bulletin for full details.

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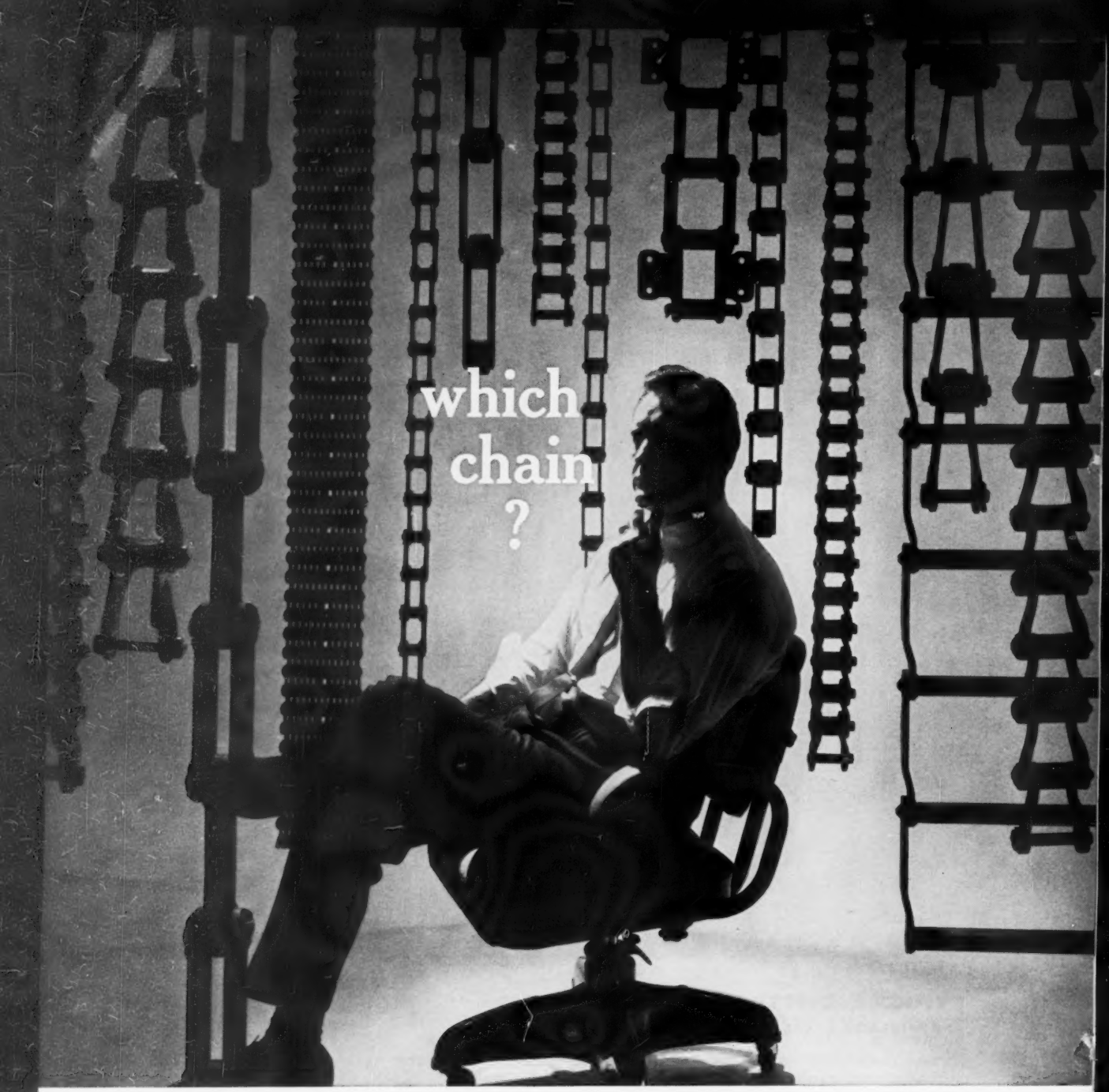
BAY STATE
WHEELS of PROGRESS



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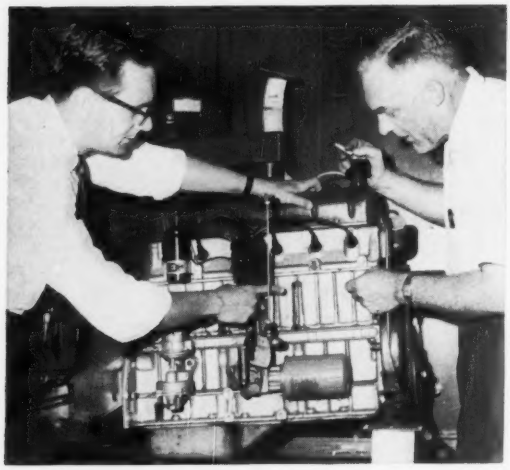
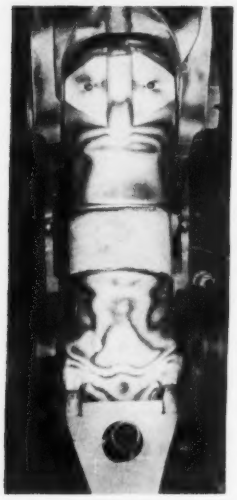
Color, Color





Turn to Page 127 for a look at an eye catcher. STEEL's article capitalizes on full color to show how a thin film of photoelastic plastic can aid product designers.

In one case, the technique helped halve the time needed to develop and design a new aluminum engine block. The result is being examined in the above photo by Detroit Editor Don Postma, left (the author), and Dr. H. N. Maier, chief physicist for Doehler-Jarvis Div. of National Lead Co. Engineers could watch and "measure" stress performance of the block as it was tested under normal operating conditions.

The process can also be used for many other jobs. The subject in the lower photo is not an Eskimo totem pole. It's a closeup of photoelastic strains on a portion of the B-58's landing gear.

Next Impact Issue

The editors are up to their eyeballs in reports, notes, translations, and many other kinds of documents that will be incorporated into our next impact issue. In two weeks (the Jan. 1, 1962, issue), you will be receiving a comprehensive study on how to overcome technological obsolescence.

One of the reports the boys have been looking over is a Department of Commerce translation of articles on Soviet machine building—they're from Russian periodicals. Those Communists use editorial columns in ways we never dreamed of. Examples:

In writing about the failure of a Russian machine tool builder to deliver when promised, N. Petrov shouts in *Industrial & Economic Gazette*: "Why are you prevaricating, comrades from Gorki? . . . It is necessary to put an end to this situation, once and for all."

In an article titled "Rotor Lines and Their Friends and Foes," A. Yefimov complains in *Moscow Pravda*: "At every conference concerned with the problem of rotor lines, the representatives of ENIMS either voiced a general criticism of the trend adopted by Engineer L. N. Koshkin or demonstratively left the field of battle, thereby emphasizing their disdain of this problem."

V. Kochetkov writes about machine tools in *Moscow Pravda*, using a definite literary style. "What Prevents Us from Working Rhythmically?" he asks in one headline. In another he comes right out and says, "Let Us Speak of Blueprints."

In an article in *Evening Leningrad*, an investigating team of newspapermen report on a large machine tool building plant. They brought defective parts to the attention of Chief Engineer Comrade Kargin. "To every part, he imperturbably remarked, 'These are not typical facts'." Like good reporters the world over, these journalists end their piece with the question: "How much 'not typical,' Comrade Kargin?"

Jargon

We were leafing through General Electric Co.'s *Research Laboratory Bulletin* the other day and were intrigued by this headline: "The Laser and the Snird." Laser means light amplification by stimulated emission of radiation, we learn. Snird means supposedly noiseless infrared detector. Of course!

Incidental Intelligence

Item: The zoo at Auckland, New Zealand, has an orangutan so fond of smoking cigarettes that he is in danger of being killed by kindness. Visitors give Turvey (that's his name) so many that he smokes practically all day.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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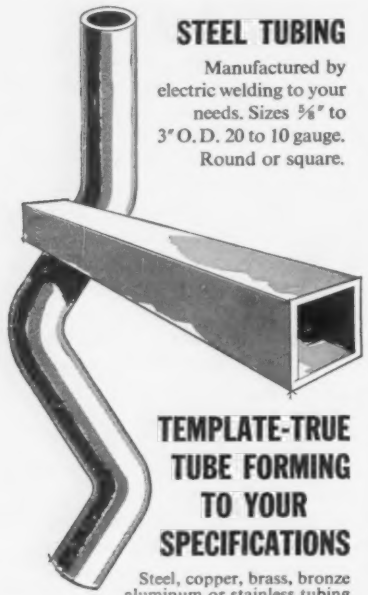

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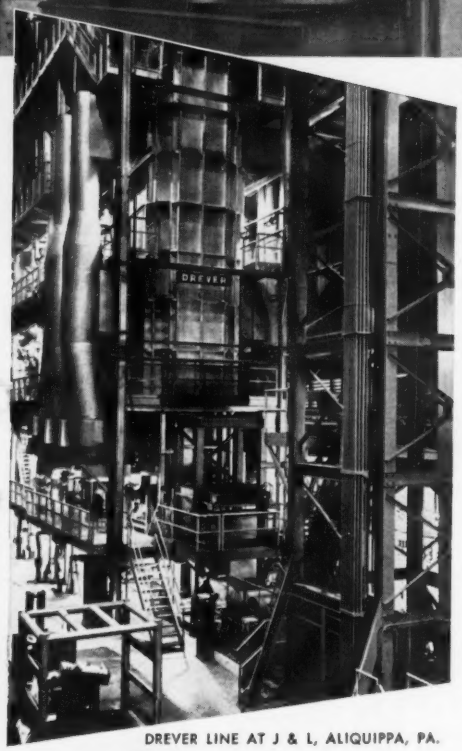

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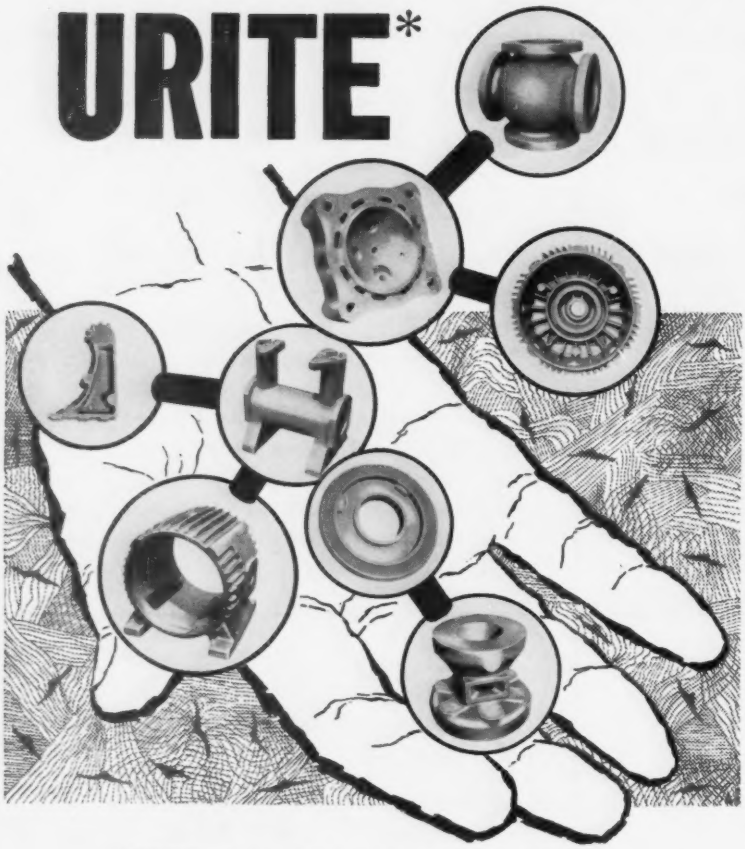

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CALENDAR OF MEETINGS

Jan. 8-12, Society of Automotive Engineers Inc.: Annual engineering congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Jan. 14-17, Institute of Scrap Iron & Steel Inc.: Annual meeting, Statler Hilton Hotel, Washington. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: William S. Story.

Jan. 15-17, AIME Minnesota Section and University of Minnesota: Annual iron ore mining symposium, Hotel Duluth, Duluth. Contact: Fred E. Berger, director, Center for Continuation on Study, University of Minnesota, Minneapolis 14, Minn.

Jan. 15-19, Steel Plate Fabricators Association: Annual meeting, Mountain Shadows Hotel, Scottsdale, Ariz. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 17, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 345 E. 47th St., New York 17, N. Y. Secretary: L. K. Wheelock.

Jan. 17, Metallurgical Society of AIME: Mechanical working conference on flat rolled products, Pick-Congress Hotel, Chicago. Society's address: 345 E. 47th St., New York 17, N. Y. Secretary: R. W. Shearman.

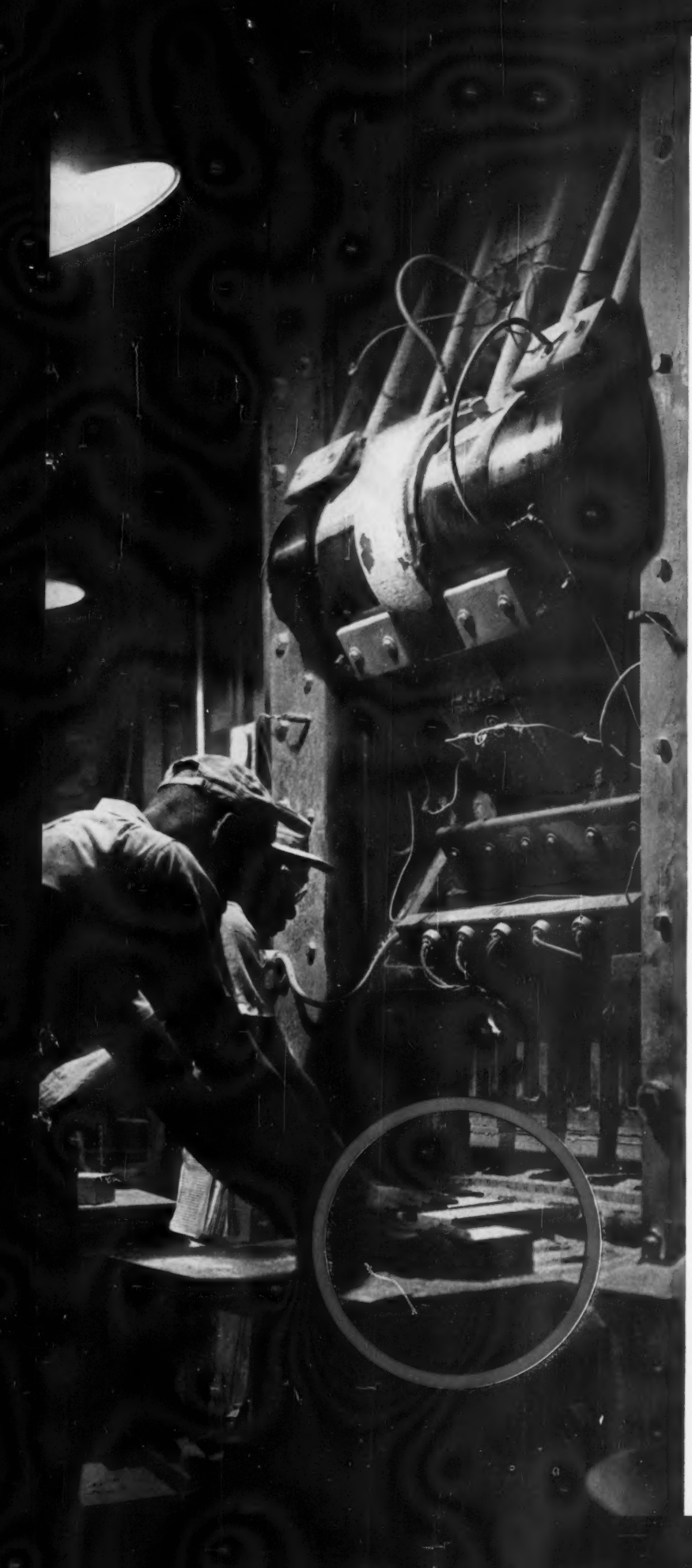
Jan. 18-19, National Industrial Conference Board Inc.: General meeting, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Jan. 22-23, Industrial Heating Equipment Association Inc.: Annual meeting, Drake Hotel, Chicago. Association's address: 2000 K St. N.W., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 22-25, Plant Engineering & Maintenance Show: Convention Hall, Philadelphia. Contact: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 23-24, Steel Shipping Containers Institute Inc.: Meeting, St. Regis Hotel, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Jan. 28-31, Truck-Trailer Manufacturers Association Inc.: Annual meeting, Palm Springs Hotel Riviera, Palm Springs, Calif. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.



REORDERS:

B&W Firebrick for electric furnace roofs and submarine ladles

This production worker is removing B&W firebrick from a large dry press in Augusta, Ga. He is speeding along a reorder of B&W Kao 70 firebrick for an electric furnace roof. His next job will be handling B&W Kao-HB for a submarine ladle in a major steel plant.

B&W Kao 70 are 70% alumina firebrick with very low total impurities that insure long life. They also offer high resistance to thermal shock. B&W Kao 70 can be profitably used in rotary hearths, malleable air furnace bottoms, non-ferrous metallurgical refining furnaces including reverberatory and brass melting furnaces, lead softening and drossing furnaces.

B&W Kao-HB high burned super duty firebrick offer an excellent balance of properties for superior service. These brick provide approximately 5% more alumina content and lower total impurities than competitive brick. They have good resistance to spalling. B&W Kao-HB can be used in all areas of heating and reheat furnaces where operating conditions are severe. Another application is blast furnace stacks.

For complete property sheets and additional information, write to . . .

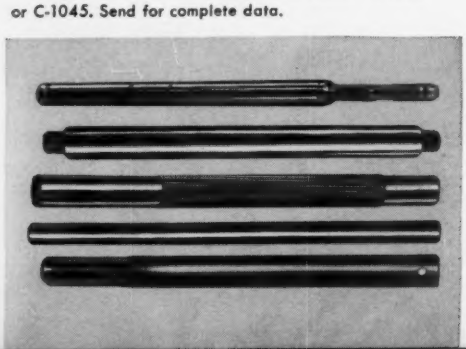
Department HM
Refractories Division
The Babcock & Wilcox Company
161 East 42nd Street
New York 16, New York

Babcock & Wilcox

REPUBLIC STEEL...

PROBLEM-SOLVING KNOW-HOW AND EXPERIENCE have made Republic a leader in custom production of Fastener and Formed Parts "Specials." Whenever standard fasteners can't do the job, you'll save time and money by contacting Republic. Write for data on Republic design, engineering, and production services.

TRIM COLD FINISHED BAR COSTS. Republic's CENTURY SERIES offers five grades of high-strength, stress-relieved, cold finished bars, each with a minimum yield strength of 100,000 psi. For highly machined parts, use C-1144. Moderately machined parts—C-1140 or C-1151. For parts where machinability is a minor factor—C-1050 or C-1045. Send for complete data.



Strong, Modern, Dependable

World's Largest Producer of SPECIALTY WELDED TUBING

Challenge us to come up with a solution to your toughest tubing applications.

We will produce the best possible answer drawn from Republic's full line of quality welded steel tubing and more than 50 years of applied engineering experience.

This claim is made with confidence. Our customers regularly hand us their tubing problems, and the results have provided mutual satisfaction.

Manufactured at the Steel and Tubes Division, Republic Tubing is welded by the ELECTRUNITE® process—a continuous electric weld method which unites the wall under pressure without foreign or extra metal. Among other advantages, this process assures uniformity of wall thickness, strength, ductility, and concentricity.

Republic, the pioneer in this improved welding process, was also the first to provide a non-destructive electronic production method of testing tubing used for critical pressure applications. This is known to the trade as FARROWTEST®.

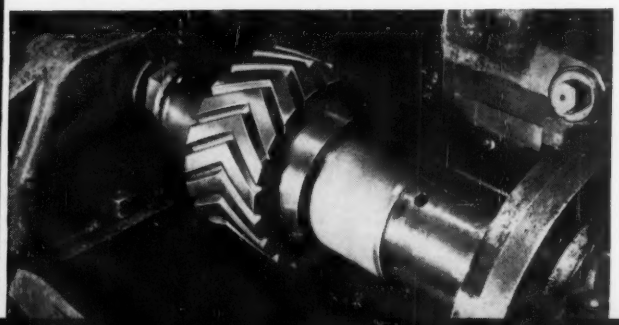
Next time you have a tubing application or problem, take advantage of Republic's prompt delivery, engineering services, and complete range of carbon and stainless steels for mechanical, structural, and pressure uses.

Call your nearest Steel and Tubes representative or contact us direct.

REPUBLIC STEEL

REPUBLIC HAS THE FEEL FOR MODERN STEEL

FOR ADDED MACHINABILITY, consider Republic Cold Drawn Leaded Alloy Steels. Leading producers of gears use Republic Leaded Alloy Steel in the manufacture of heavy-duty herringbone gears. Addition of lead increases machinability as much as 25%. Heat treating assures adequate hardness and toughness. Cost-reducing Republic Alloys are available in almost every standard analysis and many specials. Mail the coupon for information.



Check this listing of Republic Steel Tubing and Pipe. Which have possible applications in your products?

STAINLESS STEEL

Pressure Tubing

- ☐ Condenser Tubes
- ☐ Pipe—Schedule 40S
- ☐ Sanitary Tubes
- ☐ Heat Resistant
- ☐ Evaporator Tubes
- ☐ Bright Annealed
- ☐ Pipe—Lightweight Schedule 10S—5S
- ☐ Heat Exchanger Tubes

Mechanical Tubing

- ☐ Aircraft Exhaust
- ☐ Special Shapes
- ☐ Fabricating Facilities
- ☐ Polished Tubing
- ☐ Ornamental Tubing
- ☐ Clad Tubing Carbon—Stainless

CARBON STEEL

Pressure Tubing

- ☐ Boiler Tubes
- ☐ Heat Exchanger Tubes
- ☐ Hydraulic Fluid Line
- ☐ Grooved End Tubes
- ☐ Refrigerator Tubes
- ☐ Water Wall Tubes
- ☐ Superheater Tubes
- ☐ Condenser Tubes
- ☐ Evaporator Tubes

Mechanical Tubing

- ☐ Air Preheater
- ☐ Square Tubes
- ☐ Rectangular Tubes
- ☐ Special Smooth I. D. Hydraulic Cylinder Tubes
- ☐ Hot Rolled Tubes
- ☐ Cold Rolled Tubes
- ☐ Metallized Tubes
- ☐ Structural Tubes
- ☐ Fabricating Facilities
- ☐ Drawn Tubes

Cut out and send this check list for descriptive literature on Republic Tubing and Pipe applicable to your products.

REPUBLIC STEEL CORPORATION
DEPT. ST -2158
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please also send me information on:

- ☐ Republic Alloy Steels
- ☐ Republic Specialty Bolts and Nuts
- ☐ Republic Cold Finished Carbon Steel

Name_____ Title_____

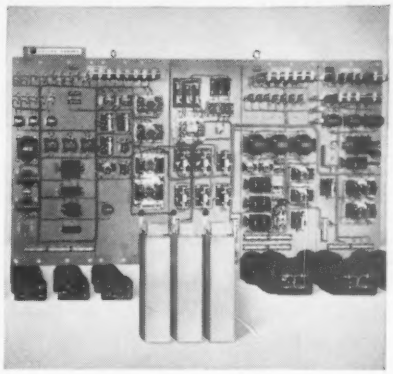
Company_____

Address_____

City_____ Zone_____ State_____

WHAT'S NEW
IN
A-C REACTOR
CRANE CONTROL?

American Hoist & Derrick Company's large 50-ton revolving crane at Port of Milwaukee features Cutler-Hammer's new a-c reactor crane control.



Reactor Control integrated panel for three-motion crane is shown above. Notice advantages of convenient front wiring in Cutler-Hammer's new steel panel system.

CONTROL

New! Get the right a-c control for your crane from Cutler-Hammer

Which of these a-c reactor control features will solve your problems?

☐ *Static* ☐ *Stepless* ☐ *Float Control* ☐ *Cushioned Starting*

To meet your most demanding needs for reactor crane control, Cutler-Hammer can supply a variety of combinations — all static and static-contactor types.

These lab and field tested options make it possible to tailor the control to the crane's working conditions . . . very important to satisfactory performance of a-c reactor controlled cranes.

CHECK THESE CUTLER-HAMMER FEATURES

- **Reactors** feature grain oriented laminated "C" cores and aluminum strip wound power coils. Entire reactor is dipped in a polyester resin to mold the various parts into a unified mass and provide permanent moisture seal.
- **In primary systems,** all four reactors are identical to simplify parts inventory. In secondary reactor controllers, three identical reactors are supplied.
- **Panels** are all front connected steel. All control and power connections are brought to terminal boards. Rear access is unnecessary.
- **Pre-amplifiers,** where used to obtain speed regulations, are static magnetic so static feature is preserved.
- **Unit panels.** Various control functions are grouped for ease of troubleshooting and maintenance.

CUTLER-HAMMER REACTOR CRANE CONTROL

Reactor Control	Primary Components	Bulletin Number	Secondary Components	Master Response	Application
Secondary	Reversing Contactors	14180	Controlled Reactors and Resistor	Torque	Reversing Plugging Bridge or Trolley Drive
		14181	Controlled Reactors and Resistor	Speed	Reversing Plugging Bridge or Trolley Drive
		14182	Controlled Reactors Resistor & Contactors	Speed	Counter-torque Hoist
Primary	Primary Magnetic Amplifiers	14186	Resistor Resistor and Fixed Reactor	Torque	Reversing Plugging Bridge or Trolley Drive
		14187	Resistor Resistor and Fixed Reactor	Speed	Reversing Plugging Bridge or Trolley Drive
		14188	Resistor and Fixed Reactors	Speed	Static Reversing Hoist Drive
		14189	Resistor and Two Contactors	Speed	Reversing Hoist Drive

WHAT'S NEW? ASK . . .

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Cutler-Hammer Canada, Ltd.; Cutler-Hammer Mexicana, S. A.

CONTROL

What's the first step in buying a crane?

BEFORE you can think about what *make* of crane you should buy, you first need to know which *type* will work out best in your yard. Do you need rubber-tired mobility? Crawler-mounted stability? Rail-mounted operating efficiency? Pedestal-mounted economy? Would a gantry or other special mount serve you best?

If you'd like some *unbiased* counsel on these matters, check with AMERICAN HOIST . . . the *only* source that builds *every* basic type of yard crane. An AMERICAN representative will be glad to survey your materials-handling needs, anytime you say. No obligation, of course.

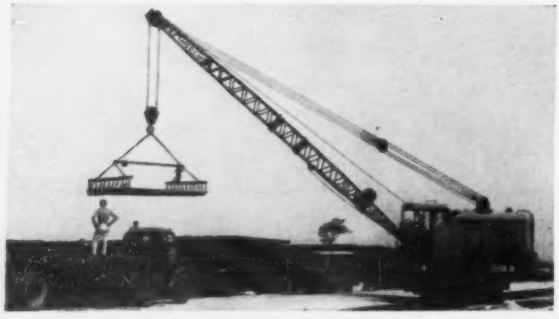
AMERICAN

AMERICAN HOIST
and DERRICK COMPANY
ST. PAUL 7, MINNESOTA

WAGON CRANE handles half a dozen varied assignments, in as many yard locations, for this producer of vitrified pipe. Here, it places huge steam curing cover over "green" pipe sections.

CRAWLER CRANE, with ¾-yd. re-handling bucket, unloads aggregates for building materials producer.

PEDESTAL MOUNTED CRANES are often your most economical choice for localized applications. You may also want to consider pedestal mounts, stiff leg derricks, or bulk unloaders . . . **all** are built by AMERICAN HOIST.



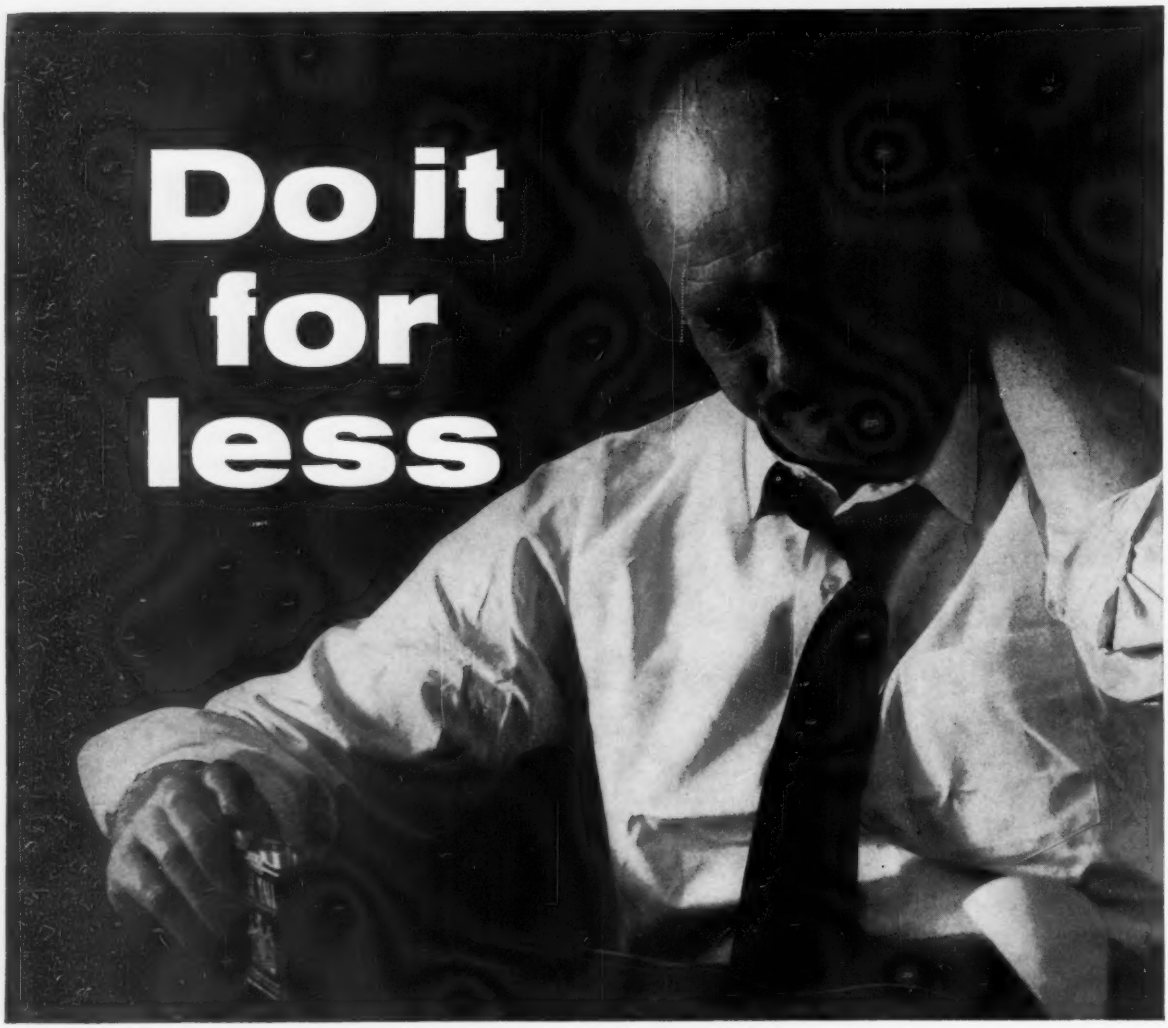
LOCOMOTIVE CRANE (left) was selected by this user as the lowest-cost method of stockpiling and loading cast iron pipe. CC-756

N-S Strip Steel...

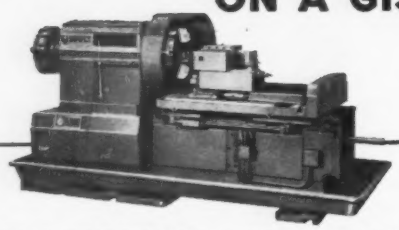
The thinness of fine paper—produced by fast, modern rolling mills, precision slitting, polishing and finishing equipment. Athenia Steel Division produces tempered spring steel, annealed strip, flat wire, stainless strip and valve spring wire, offers experienced technical service for your special requirements.

NS
NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD COMPANY
Athenia Steel Division
Clifton, New Jersey



ON A GISHOLT SIMPLIMATIC



Gisholt MASTERLINE Simplimatic Automatic Chucking Lathe

—The essence of the building block principle—

—Standard headstock and bed . . . a wide screw-fed platen

—Standard front, center, rear or auxiliary slides with tool blocks

—Positioned to machine a maximum number of surfaces per chucking

—Accessories include JETracer Slides—attachments for simultaneous front and back machining.

Ask your Gisholt Representative or write for Catalog 1159-C.

If you think in terms of "specials" to machine rings, discs, flywheels, sheaves, bevel gears, motor frames or complex housings, it will pay you to investigate the Gisholt Simplimatic. You can save money and precious lead time with the flexibility offered by this *standard* automatic lathe.

Standard "building block" tooling elements provide an infinite variety of arrangements to combine operations, reduce handling, improve quality, and cut floor-to-floor times to a minimum. Many so-called "special" jobs are now being done on the *standard* Gisholt Simplimatic. We invite you to compare the results. You'll find that you, too, can do it for less!

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

Durable Goods: 1962's Chief Gainer Over '61

"Durable goods spending should continue to increase in the months ahead, hit a record high in the first half of 1962, and qualify as the major reason for 1962 being a better business year than 1961," predicts Robert S. Ingersoll, chairman, Borg-Warner Corp., Chicago. Noting that October orders for durables were the highest since June, 1959 (prior to the steel strike), he bases his forecast on "predicted increases in plants and equipment, new homes, and steel, auto and appliance production."

Blough Lashes High Employment Costs and Short Workweek

The nation's "employment-cost chickens are coming home to roost," declares Roger M. Blough, chairman, U. S. Steel Corp. "We are importing more than 1½ tons of steel for every ton we export where formerly (the U. S.) exported 3 to 5 tons for every ton imported"—and this in the face of talk about a 32 hour week, he says. A shortened workweek, he emphasizes, would only add to employment costs and further jeopardize our position in the world and domestic market place. "What this nation really needs more than annual rounds of wage and cost increases are a few annual rounds of cost reductions which can result in price decreases. From 1952 to 1959, eight nations . . . abroad increased employment costs on an 8 hour basis about $2.80 a day while we increased ours nearly $12 a day . . . It is no fun to be the highest paid, but most unemployed steelworker in the world."

Deus ex Machina Steals the Show

A possible epilogue to steel's Greek tragedy (see STEEL, Nov. 20, p. 59) is suggested by George Romney, American Motors Corp. president. The U. S. faces the grave economic danger of a steel strike and "the potentially greater evil" of a settlement dictated by government, he warns. He sees the upcoming steel wage negotiations as a possible entry for federal "dictation" that would lead toward eventual government control of the industry. "A repetition of White House intervention . . . is not the right answer. It is not an adequate answer or an American answer. The problem is excess union power and employer power—with a resort to government power, which hastens us along the road to government control and collectivism."

'62 Looks Good to Material Handling Equipment Makers

"Independent surveys indicate that in 1962, a record amount will be spent for new equipment, plant renovation, and automation to replace less effi-

cient facilities," observes Roy L. Wolter, president, Industrial Truck Association. He thinks this will lead to a "substantial increase" in lift truck sales. B. E. Phillips, president, Material Handling Institute Inc., says: "Sales during 1962 of material handling equipment, attachments, and accessories will be 5 to 7 per cent greater" than in 1961.

Unions' Share of Labor Force Shrinks

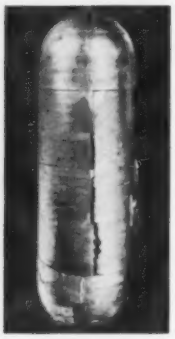
Union membership has not kept pace with the growing U. S. work force as shown in these Labor Department statistics:

Year	Union Membership (Thousands)	Total Labor Force Number (Thousands)	Total Labor Force Percentage	Nonfarm Employment Number (Thousands)	Nonfarm Employment Percentage
1953	16,948	67,362	25.2	49,681	34.1
1954	17,022	67,818	25.1	48,431	35.1
1955	16,802	68,896	24.4	50,056	33.6
1956	17,490	70,387	24.8	51,766	33.8
1957	17,369	70,746	24.6	52,162	33.3
1958	17,029	71,284	23.9	50,543	33.7
1959	17,117	71,946	23.8	52,205	32.8
1960	17,049	73,126	23.3	53,137	32.1

AISI Reports on Rising Labor Costs

Iron and steel companies' revenues increased 2.7 per cent per employee from 1956 to 1960 while employment costs per employee rose 20.1 per cent, says the American Iron & Steel Institute. Payroll cost for hourly employees set a record in October of this year—$3.548. The figure was $3.486 in September, 1961, and $3.321 in October, 1960. Employee benefits brought the October, 1961, hourly total to about $4.05.

Color Tests Predict Performance



To prevent component failures like that in the photo, engineers are using color patterns to measure a product's chance of survival in service. The story beginning on Page 127 shows how a thin film of photoelastic plastic can aid product designers. In one case, the technique helped halve the time needed to develop and design an aluminum engine block. The process can be used on castings, forgings, machined parts, stampings, assemblies, or nearly any other workpiece. Dr. Felix Zandman, research director, Instruments Div., Budd Co., says that more than 60 companies are using the technique as a standard design tool.

Structural Steel Gains to Continue in '62

Harold G. Lewis, president, American Institute of Steel Construction, expects 1961 to be the third best year for the structural steel industry. Bookings for the year are estimated at 4 million tons, up 11 per cent from 1960's. The two top years: 5.25 million tons in 1956 and 4.8 million in 1955. His outlook for 1962: An increase of about 6 per cent. Most of the gain is expected to come from industrial building (about 1.35 million tons vs 1.15 million tons in 1961).

Tractor Driver Performs Risky Jobs from Safe Distance

The "Spook," an 82,900 lb tractor shovel, obeys the radio commands of its operator. Developed by Allis-Chalmers Mfg. Co. to remove the man from the driver's seat for dangerous jobs, the tractor will first be used for slag removal in open hearth operations.

A Checklist for Profit Growth

The last article in STEEL's Profit Growth series begins on Page 95. It has a checklist of steps to take in your journey to profit improvement. The 64 suggestions are based on the successful practices of top metalworking companies. Find those most needed by your company—any one could change your profit picture.

Foreign Steel's Real Impact on U. S. Still Lies Ahead

Continuing pressures "seem likely to rule against any immediate major price increases," says Thomas F. Patton, president, Republic Steel Corp. Commenting on one of the downward pressures on steel prices—steel imports—he warns: "We've only seen a small impact so far. But as steel capacity in the rest of the Free World expands and when there is a leveling off in demand in their own countries there will be increasing attempts by foreign steelmakers to penetrate U. S. markets."

'E' Flag Becomes Symbol of New Defense Effort

"The 'E' flag that once flew over plants making notable records in war production now will fly over factories contributing significantly to the goals of international peace and prosperity," says President Kennedy. On Dec. 5, he ordered the establishment of an award program to grant recognition to firms which contribute significantly to the Export Expansion Program.

Germany: Booming Market for U. S. Metalworking

During the first three quarters of 1961, U. S. exports to Germany totaled $1.1 billion. Several gains were registered for metal products. Examples: Machinery sales rose $30 million; air and road vehicle shipments, $18 million; electrical products exports, $16 million. Dr. Franz Josef Strauss, German defense minister, says his country will purchase about $700 million worth of weapons and other military equipment in the U. S. next year—about the same volume as it is buying this year.

Thermoelectric Refrigerator for Nuclear Subs

Whirlpool Corp. has completed the development and construction of a large thermoelectric refrigeration system for the U. S. Navy Bureau of Ships. Designed for nuclear submarines, the system can preserve more than 6 tons of frozen and chilled foods. It has no moving parts, meaning that com-

STEEL
The Metalworking Weekly

December 18, 1961 Vol. 149 No. 25

CONTENTS

THE EDITOR'S VIEWS:
Watching Nellie 81

WINDOWS OF WASHINGTON:
Goals in Unemployment Survey ... 92

MIRRORS OF MOTORDOM:
'62 Auto Sales May Top Production 101

THE BUSINESS TREND:
Business Indicators Spur Optimism . 105

NEWS SECTION:
Capital Spending Continues Uptrend 85
U. S. Mulls Stockpile Shifts 86
Firms Planned Painless Merger 88
The Why of Organizational Changes 90
Program for Management—Here's Checklist for Profit Growth 95
Coke Eliminated in Ironmaking ... 115

TECHNICAL SECTION:
Technical Outlook 125
Machine Team Crops Housing Cost . 126
Color Tests Predict Performance .. 127
Rotary Machine Ups Output 400% 131
Progress in Steelmaking—Cleaner Stainless from Brush Washing .. 136
Controlled Roughness: Paint Sticks 138
Tanks Formed from Single Sheets .. 141

MARKET SECTION:
Market Outlook 167
Complete Index to News and Prices 167
More Japanese Steel Imports? 169
Iron Ore Imports Are Off Sharply 172
Extras on High Strength Steel ... 173
Steel Order Rush Pushes Output .. 173
District Ingot Rates and Chart 176
Scrap Price Upturn Is Stalled 189
Nonferrous Metals—Harvey Aluminum Maps Major Expansion 192

DEPARTMENTS & INFORMATION:
Servicenter 5
Editorial and Business Staffs 6
Calendar of Meetings 10
Metalworking Week 19
Metalworking Pulse 22
The Trader's Horn 91
Men of Industry 109
New Products 145
New Literature 165
Advertising Index 196

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Engineering Index Inc.
345 E. 47th St., New York 17, N. Y.

pressors, motors, condensers, and conventional refrigeration components are eliminated. Service requirements are virtually eliminated.

Electrical Appliance Sales Rebound

Sales of electrical appliances are improving after lagging the year ago pace in the first half. Here are the latest statistics from the National Electrical Manufacturers Association . . .

	Unit Sales, January-October	
	1961	1960
Electric Refrigerators	2,925,900	2,958,500
Freezers	913,800	910,100
Ranges	1,299,300	1,291,200
Water Heaters	634,100	608,400
Dishwashers	487,200	458,400
Waste Disposers	683,600	644,700
Dehumidifiers	367,000	394,800
Room Air Conditioners	1,418,500	1,425,300

Straws in the Wind

Advertising expenditures in West Germany are expected to be 35 per cent higher this year than last, reports the German-American Chamber of Commerce . . . "Construction equipment sales abroad should continue to be good, and we believe there will be an improvement in sales in the U. S.," says Frank W. Jenks, president, International Harvester Co. . . . The Metal Treating Institute reports that billings for the first ten months were 5.1 per cent off the $35 million pace of the year ago period. . . "The momentum that has been built up in the fourth quarter will carry the rubber industry . . . into what is predicted to be its most prosperous year," says Harvey S. Firestone Jr., chairman, Firestone Tire & Rubber Co. . . . Northwestern University says companies which regularly hire college graduates will seek many more in 1962. The increases: 26 per cent more engineers, 19 per cent more nonengineers. Starting salaries will rise about 3 per cent . . . The Automobile Manufacturers Association has recommended that all members incorporate "blow-by" devices on 1963 cars and trucks to reduce hydrocarbon emissions.

Metalworking Pulse

The Business Trend: Spurred by gains in output of steel and electricity, STEEL's industrial production index is within 4 points of a new record. It gained 3 points in the week ended Dec. 9. **Autos:** Production is holding at the 160,000 unit a week level. Truck output is maintaining a weekly pace of 26,000 units. **Steel:** Operations of U. S. steelmakers have risen to the highest level since April, 1960. Further production boosts are expected after the holidays.

• INDUSTRIAL PRODUCTION INDEX

(1947-49 = 100)

Week ended Dec. 9 .... 181†
Year ago 150

Details on Page 108

• PASSENGER CAR OUTPUT (UNITS)

Week ended Dec. 16 160,000*
Year ago 130,711

Details on Page 102

• STEEL INGOT OUTPUT (TONS)

Week ended Dec. 16 2,220,000*
Week ago 2,158,000

Details on Page 178

†Preliminary. *Estimated.

MACHINE IT FOR LESS / CINCINNATI

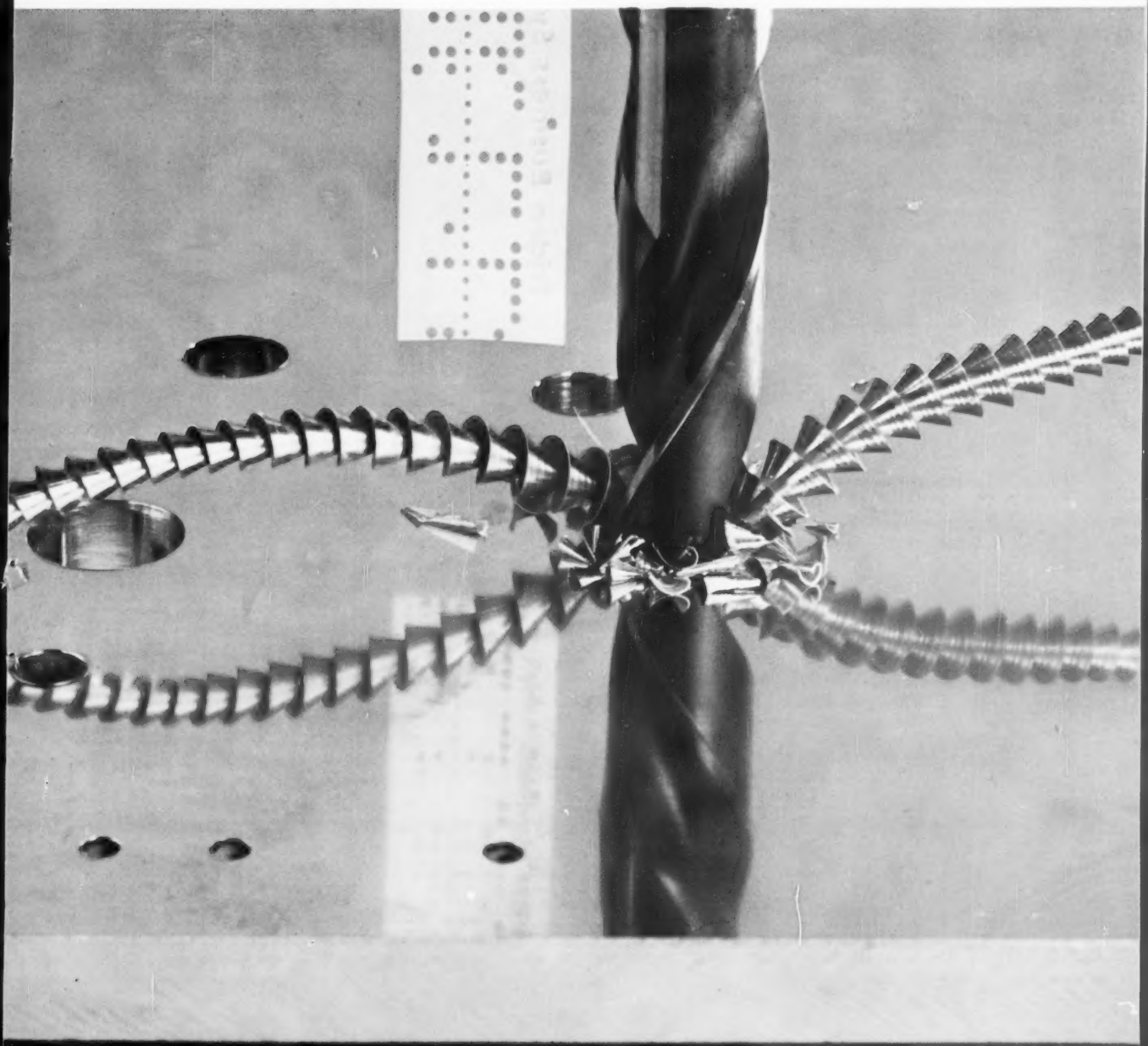
A 7-man shop drills holes like these with tape control

You don't have to be a giant to gain big savings through numerical control. A small, seven-man shop located on the eastern seaboard has demonstrated this fact over and over with a recently installed Cintimatic Drilling Machine.

Numerically controlled with tape programming, the new unit permits fast production while maintaining positioning accuracy with uniform tolerances. It eliminates need for costly drilling jigs and minimizes set up time. Moreover, ACRAMATIC control reliability permits use of Cintimatic Drilling Machines in any shop, even those which do not have a high level of electrical maintenance.

Cintimatic Drilling Machines, produced by Cincinnati Lathe and Tool Co., now put tape-controlled drilling within reach of every manufacturer. For complete details and specifications, turn the page.

CINCINNATI



CINTIMATIC 25-INCH DRILLING MACHINE:

*Base Price $14,500 complete, including controls**

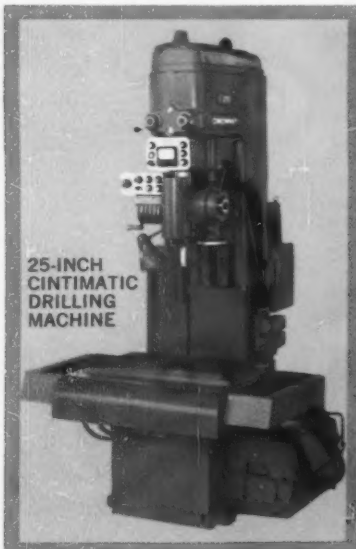
The basic drilling unit is the head and upper frame of a standard Cincinnati sliding head drilling machine, powered by a 3-hp drive motor. Cincinnati INFISPEED variable speed drive is standard equipment. The unit is mounted on a rugged, fixed base with built-in leveling screws.

The large work table travels on ball bearings supported on hardened rod ways, rigidly supported along their entire length. Table motion is achieved by hydraulic cylinders. Position is determined by a feed back unit operating from a precision, backlash—eliminated rack and pinion.

While the drilling unit and table are produced by Cincinnati Lathe and Tool Co., the ACRAMATIC Control Console is manufactured by The Cincinnati Milling Machine Co. Result: responsibility for satisfactory performance rests with one source—Cincinnati, second to none in machine tool engineering.

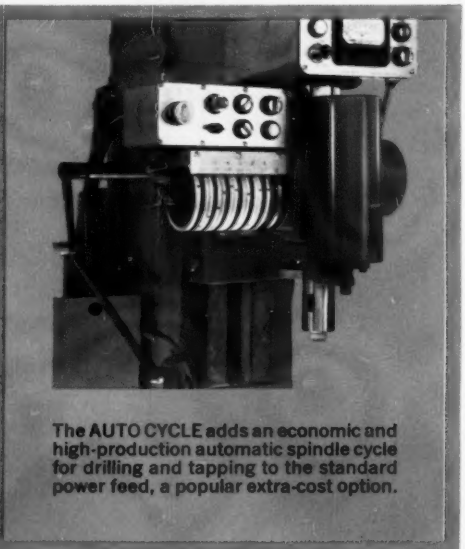
Call your Cincinnati Lathe and Tool distributor for complete information. Or write Cincinnati Lathe and Tool Co., subsidiary of The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

*Price subject to change without notice.



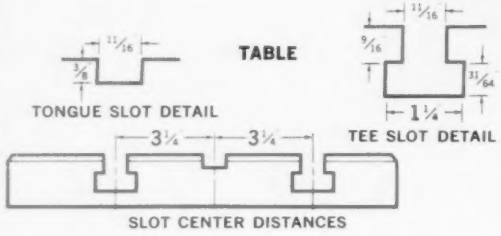
25-INCH CINTIMATIC DRILLING MACHINE

ACRAMATIC Control Console permits full tape control or manual operation of machine with ultimate in reliability.



The AUTO CYCLE adds an economic and high-production automatic spindle cycle for drilling and tapping to the standard power feed, a popular extra-cost option.

SPECIFICATIONS



Longitudinal travel	19.999 in.
Cross travel	9.999 in.
Working surface	26 in. x 12¾ in.
Tee slots	2
Tongue slots	2
Drive	Hydraulic cylinders
Positioning rate	120 in. per minute
Absolute positioning accuracy	±.002" in 12 in.
Repeatability	±.0005"

CONTROL

Type	Cincinnati ACRAMATIC
Electrical Supply	220/440 volts, 60 cycles, three phase
Tape	1-in., 8-track

25-INCH DRILL

Horsepower	3
Spindle	No. 4 Morse taper
Spindle speeds, back gear drive	60-1825 rpm
Rates, power feed	.002, .004, .007, .010, .015
Spindle travel	8¾ in.
Distance—spindle to table—min./max.	2¾/19½ in.
Distance—dovetail to spindle center	12⅝ in.
Vertical adjustment—sliding head	8 in.

STANDARD EQUIPMENT

Complete CINTIMATIC Drilling Machine includes motor, controls and INFISPEED drive; ACRAMATIC control console with electrical equipment, hydraulic power supply and tape reader; positioning table.

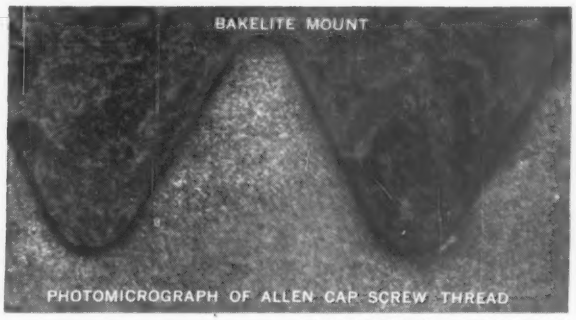
CINCINNATI

PQA* proves it

This Allen screw passes multi-million-cycle test under high load conditions

50X Magnification—unretouched

Here you see a competitive socket-head cap screw where thread laps and deep decarburization (lighter area running through roots of threads) caused premature failure of the screw. When used under high load conditions in an outboard crankshaft-connecting rod-piston assembly, such a screw failure would cause great motor damage.



50X Magnification—unretouched

Now look at this Allen Socket Cap Screw. Photo was taken during regular quality control test and shows no thread lap or decarburization. Allen is producing to and inspecting in accordance with MIL-B-7838A for thread discontinuities—your assurance of quality!

*PRODUCT QUALITY ASSURANCE

PQA is the symbol of unquestioned quality at Allen. It stands for *constant* quality control from rigid upgrading of incoming raw materials to shipment of finished products—*plus* an unconditional guarantee that backs up every order!

Quality checks like the one illustrated confirm PQA every step of the way through Allen's manufacturing process. Remember . . . it costs no more to have *genuine* Allens right from stock, and they are only a minor fraction of your assembly costs.

Genuine ALLEN products are available only through your ALLEN Distributor. He maintains complete stocks close by to help cut your freight costs, inventory, warehousing and handling. He offers fast, single-source service. He knows ALLEN products. And he makes ALLEN Engineering Service available to you any time. Call him!

ALLEN

MANUFACTURING COMPANY

HARTFORD 1, CONNECTICUT, U.S.A.

ALLEN HEX-SOCKET SCREWS HEAD

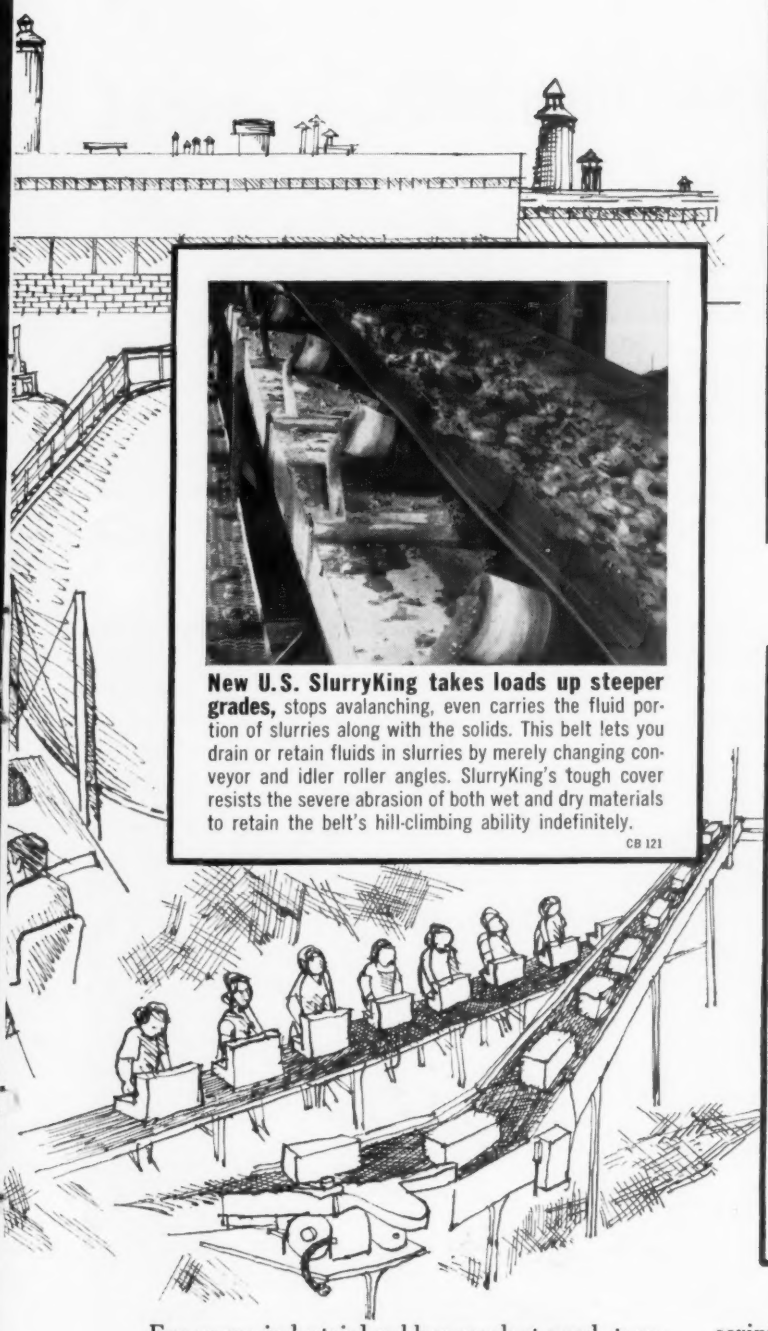
Plant at Bloomfield, Connecticut • Warehouses in Chicago, Cleveland and Los Angeles

US AT THE HEART OF INDUSTRY...

A murderous combination meets its master in this leading Southern foundry as U.S. FoundryGiant RipStop Conveyor Belts withstand hot foundry sand loaded with jagged pieces of cherry-red tramp iron...last 8 times longer than other belts. Special internal wire ribs prevent jagged pieces of metal flash, sprues, gates, and other abrasive material from tearing and wrecking the belt.

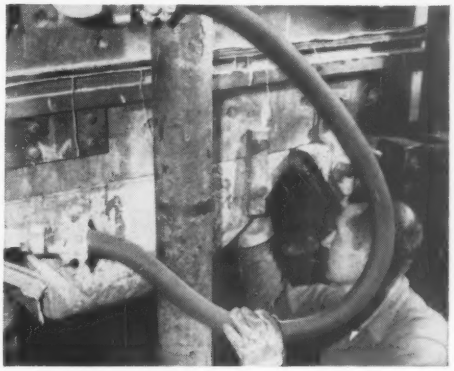
CB 114

Wherever industry needs "muscle" for the job, it calls on US. U.S. Rubber products make jobs easier, more efficient, more profitable for manufacturer and operator alike. By understanding and meeting the needs of industry, US has become the world's largest producer of industrial rubber products.



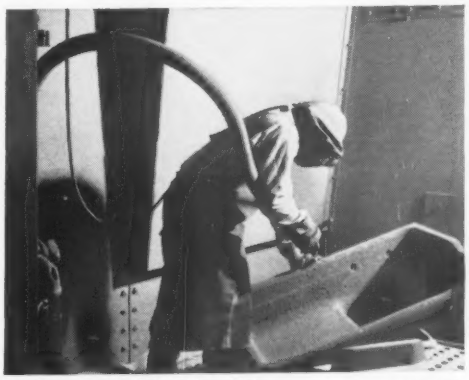
New U.S. SlurryKing takes loads up steeper grades, stops avalanching, even carries the fluid portion of slurries along with the solids. This belt lets you drain or retain fluids in slurries by merely changing conveyor and idler roller angles. SlurryKing's tough cover resists the severe abrasion of both wet and dry materials to retain the belt's hill-climbing ability indefinitely.

CB 121



Live steam, inches away – yet this man's safe, next to the hose that death-causing steam cannot burst. U.S. Matchless® Steam Hose has its own built-in safety device. When it's ready for replacement, the wire-braid construction prevents it from bursting. Instead, just a wisp of steam seeps through, letting you know it's time for a new hose.

H 109



In the tough jobs like this one, U.S. Rainbow® Sandblast Hose demonstrates its exceptional qualities. Carrying sand or steel shot after other hoses have failed, this hose provides safety as well as long wear. Its durable rubber tube is especially treated with a highly conductive material to dissipate static electricity, and its strong carcass flexes easily to prevent kinking.

H 122

For every industrial rubber product need, turn to US. For Conveyor Belts, V-Belts, the original PowerGrip "Timing"® Belt, Flexible Couplings, Mountings, Fenders, Hose and Packings . . . custom-designed rubber products of every description. Discover why U.S. Rubber has become the largest developer and producer of industrial rubber products in the world. See your U.S. Rubber Distributor or contact US directly at Rockefeller Center, New York 20, N. Y.

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OF INDUSTRIAL RUBBER PRODUCTS

US RUBBER

United States Rubber

MECHANICAL GOODS DIVISION

For Stainless Steel, call your nearest Steel Service Center

Give your product a marketing edge with USS Stainless Steel

Stainless Steel has a long-standing reputation for making good *first* impressions on a customer. A product made of Stainless Steel is bound to catch a customer's eye—because most people recognize quality when they see it, and Stainless certainly speaks quality wherever it appears—in industries, on farms or in retail stores. But the good thing about Stainless Steel is that its reputation is a *lasting* one. Because of its many advantages—excellent appearance, corrosion resistance, strength and long life—today's consumers know that the products they buy of Stainless Steel have an added value. That is why a product made of Stainless Steel can enjoy a competitive edge.

You add sales appeal to your product with Stainless Steel. Your designers will tell you that Stainless Steel gives wings to their imagination. They can save weight, because Stainless is so strong they don't have to "over-design." And reduction of weight can cut handling and shipping costs. Stainless improves appearance with a genuine gleam—a gleam that is as deep as the metal itself, not just a thin coating. And Stainless is not difficult to fabricate and join. Investigate new markets and uses for Stainless Steel in your products; write for further information. United States Steel, Room 6395, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS is a registered trademark.

The broiler of the future is Stainless Steel—and it's here today

This infrared broiler by South Bend Range Corporation, South Bend, Indiana, can broil meat in half the time it would take a conventional broiler. It is used in many leading restaurants, and its operation is based on direct infrared heat waves that travel at the speed of light. They heat only the meat, not the area around it. They cook a delicious meal in seconds instead of long minutes. These compact, highly efficient broilers are easy to keep clean and sanitary—prime requisites in any restaurant kitchen—because Stainless Steel's surface is so "dense" and smooth it does not harbor bacteria. For this reason, most good restaurant broilers and ranges—and most restaurant kitchens—are Stainless Steel.

A Stainless Steel cyclone could save you $50,000 a day

If a cyclone in a fluid bed cat cracker breaks down, it could cost a refinery $20,000 to $50,000 a day. This isn't likely if the cyclone is fabricated from Stainless Steel. Although Stainless cyclones are subjected to extreme heat, erosion, and sulfur corrosion, they *keep* their strength where other materials soon break down. Stainless Steel has outstanding corrosion resistance for a wide range of reagents, excellent high temperature strength and a smooth, easy-to-clean surface. The Ducon Company, Inc. of Mineola, N.Y., fabricates the cyclone shown here.

Stainless Steel milk cans pay for themselves

The John Wood Company, St. Paul, Minnesota, makes Stainless Steel milk cans and sells or leases them to dairies for use in milk dispensers. Even after 20 years of hard usage a Stainless Steel milk dispenser can will still be in excellent shape. And it will have a perfect attendance record—not one day's work lost . . . and no leakage. It will keep milk clean and pure. That's because Stainless Steel can be thoroughly cleaned thousands of times and still retain its smooth, impervious surface. You don't have to baby Stainless Steel; it's strong. Stainless Steel milk cans mean economy in the long run. There are practically no replacement costs because Stainless Steel milk dispenser cans just won't wear out.

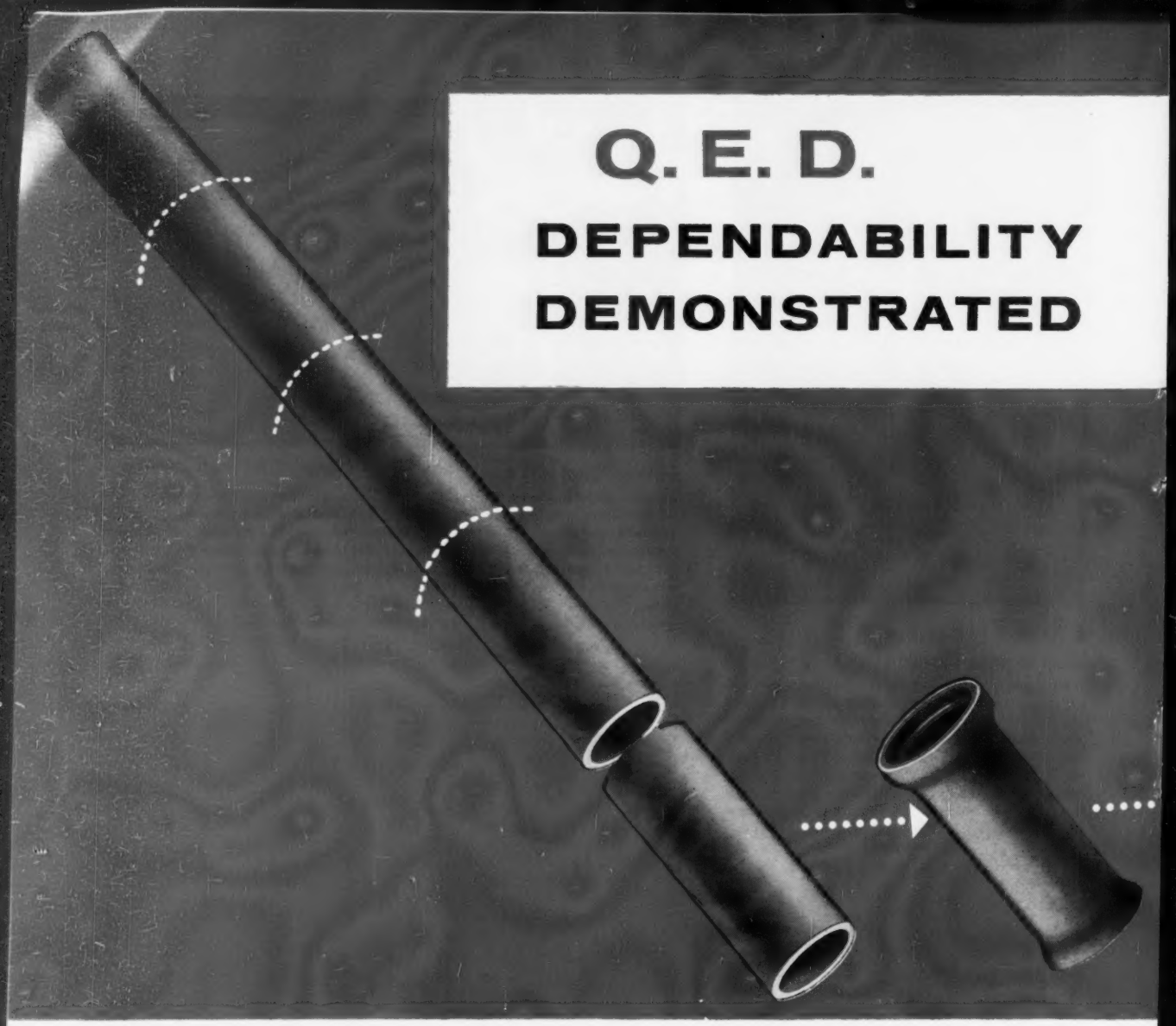
Live-wire bank invests in Stainless Steel

This Stainless Steel drive-up bank window was made by Diebold Incorporated, Canton, Ohio. They chose Stainless Steel because it immediately reflects taste and quality. It looks better and works harder than any other metal—it stands up to the weather, drastically reduces maintenance costs. Since Stainless Steel's finish is as deep as the metal itself, it can never chip, peel or wear off. These advantages, together with Stainless Steel's fabrication ease and superior strength, make it the ideal metal for your use—and give your product a distinct marketing advantage because Stainless Steel invariably denotes quality to consumers.

Tank car leads a pure life—it's Stainless Steel

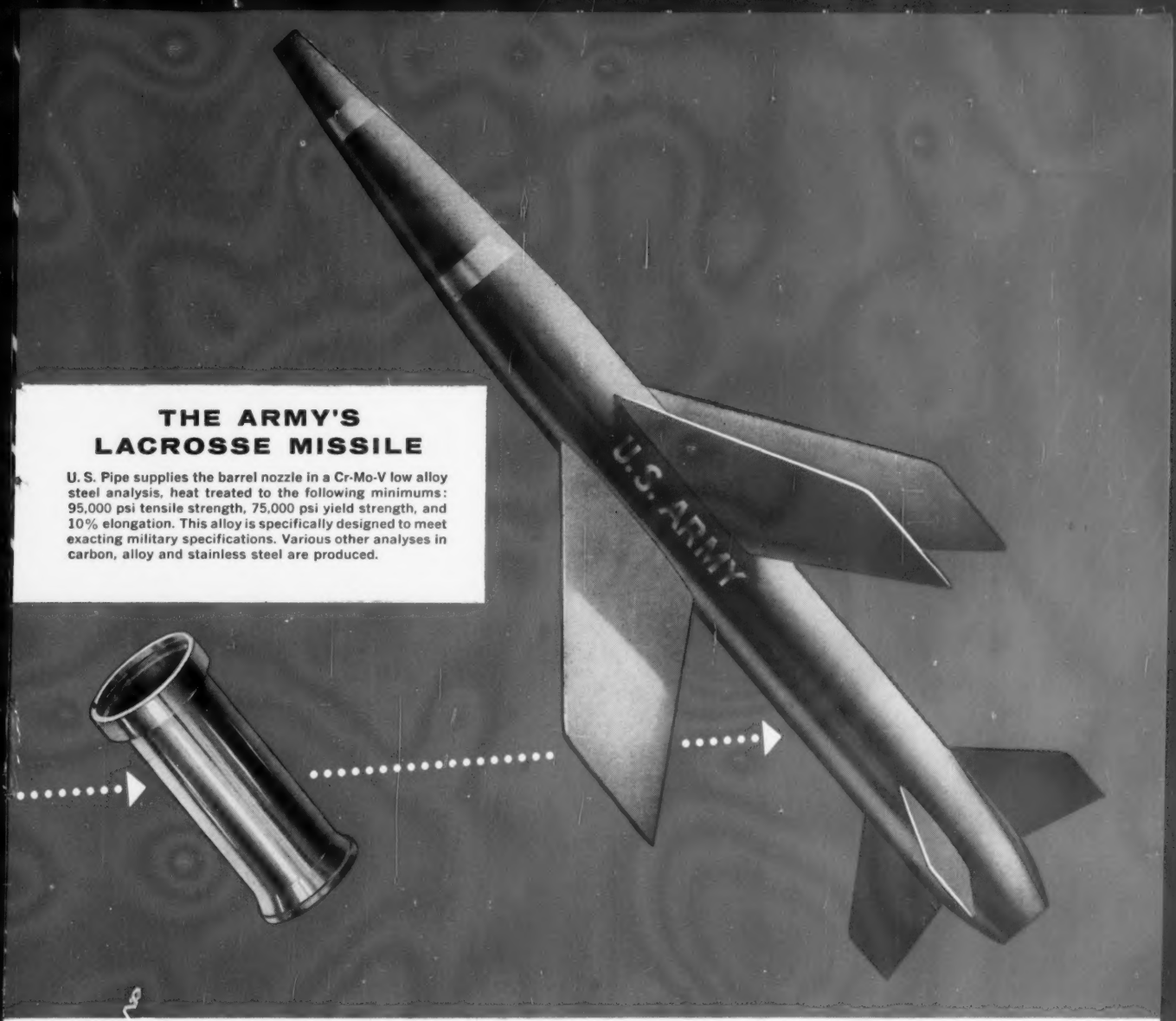
You can ship or contain corrosive chemicals in Stainless Steel tank cars with no worry about contamination. Many chemicals that eat away other metals have no effect on Stainless Steel because of its smooth, corrosion-resistant surface. There's less danger of spoiling one product with residue from another because of Stainless Steel's ease of cleaning. And because Stainless Steel is so strong, it can be used in thinner, lighter gages so over-all weight is reduced and payload increased. The car shown here was built in 1956 by General American Transportation Corporation and is still in excellent condition.

USS United States Steel



Q. E. D.
DEPENDABILITY DEMONSTRATED

Now... basic characteristics of Metal Mold Centrifugal Casting contribute to the reliability of new Lacrosse Missile



THE ARMY'S LACROSSE MISSILE

U. S. Pipe supplies the barrel nozzle in a Cr-Mo-V low alloy steel analysis, heat treated to the following minimums: 95,000 psi tensile strength, 75,000 psi yield strength, and 10% elongation. This alloy is specifically designed to meet exacting military specifications. Various other analyses in carbon, alloy and stainless steel are produced.

Centrifugal casting, a direct production approach to quality, is now finding new and increasingly useful applications in rocketry and missile engineering.

U. S. Pipe, for example, supplies the alloy steel barrel nozzles for the Army's Lacrosse Missile as semi-finished, partially hot-forged lengths. These production pieces are being supplied to The Martin Company, Orlando, Florida — prime contractor for the Lacrosse, and to Parish Pressed Steel, Reading, Pennsylvania — subcontractor to The Martin Company. The contractors then finish machine them for assembly in the propulsion units.

Centrifugal casting offers ordnance design engineers several outstanding advantages:

1. Versatility. Many different alloy and stainless steel analyses, sizes and contours can be produced starting with a hollow billet.

2. Dependability. Years of experience in producing metal mold centrifugal castings assures high quality and reproducibility.

3. Economy. Maximum utilization of the *right* material produced with a minimum of processing to achieve overall efficiency.

Can these basic qualities meet the requirements and lower the cost of your material needs? Write today and outline your particular problem.

Size Range & Composition Flexibility
Outside Diameter—6" to 60" • Wall Thickness—⅜" and up
Length—Up to 25'
Types of Steel Cast, Carbon, Alloy and Stainless—all standard AISI and ACI grades.

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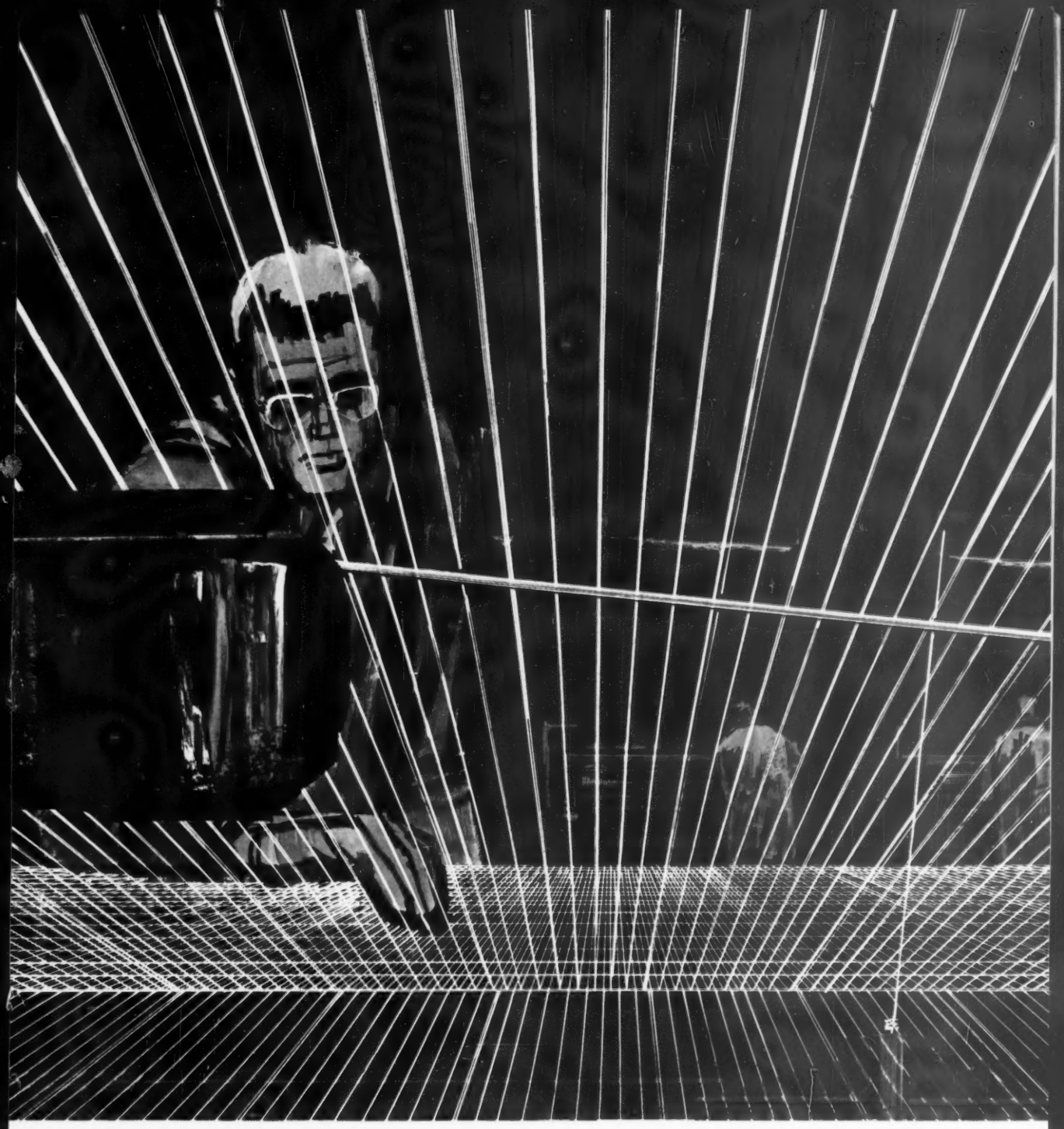
Give steels that extra "edge" *with Vancoram Columbium Alloys*

Gleaming stainless, carbon steels, high-temperature alloys, and rugged low-alloy constructional steels all develop improved properties when they're made with Vancoram Columbium Alloys. To give austenitic stainless steels better weldability, and to promote formation of stable columbium carbides, use Vancoram Ferrocolumbium. In straight chromium stainless, addition of Ferrocolumbium will prevent "roping," and in carbon and low-alloy constructional steels columbium improves strength. Both the regular Vancoram Ferrocolumbium and Thermocol® Exothermic Ferrocolumbium provide extremely low, controlled tin residual and high columbium content. Thermocol permits large additions of alloy with minimum heat loss, and its high recovery (often over 90%) means lower production costs. See your VCA Representative or write for full details. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals

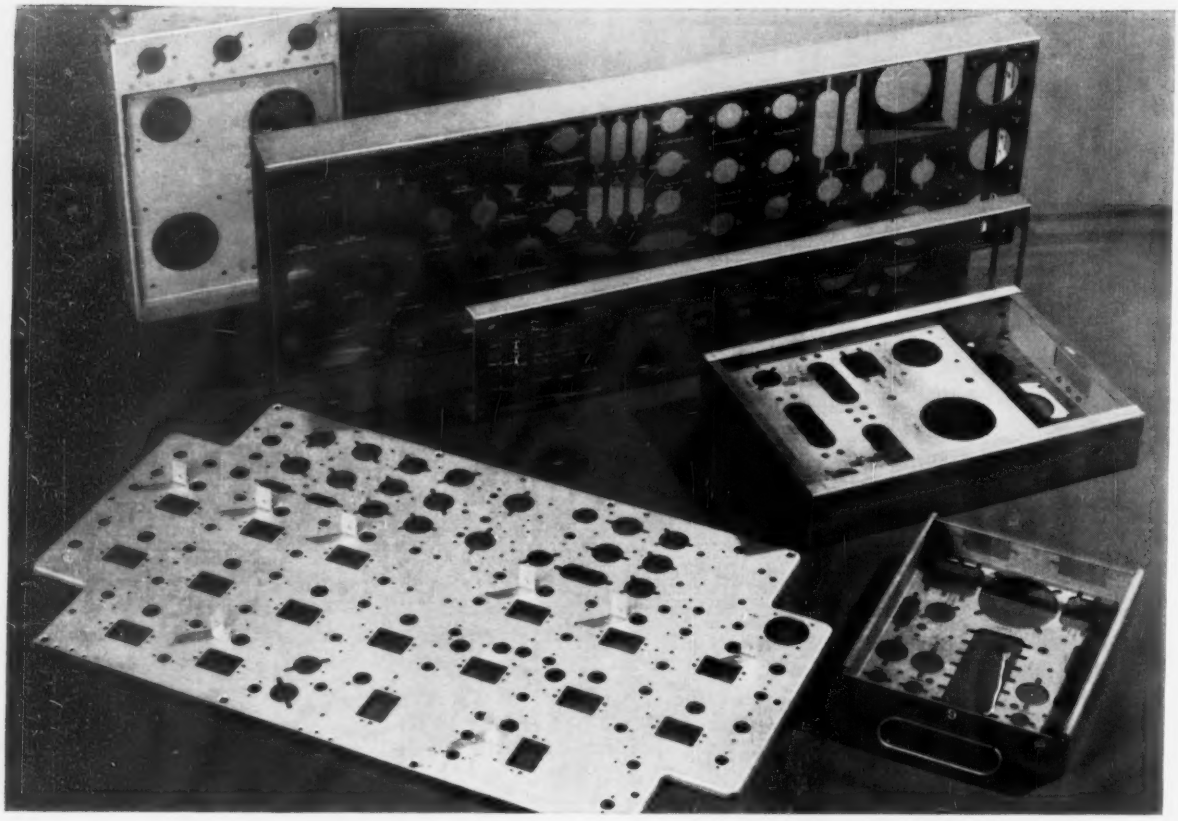


N-S Wire Cloth...

The versatile metal cloth for screening, filtering, radio frequency shielding, fabricating, ventilating . . . for thousands of modern industrial uses. Reynolds Wire Cloth is woven on special-built looms, in square weaves up to 250 mesh, filter weaves up to 2500 mesh. N-S produces all types of wire cloth including new high temperature superalloys. Consult N-S today for your special requirements.

NS
NATIONAL STANDARD COMPANY

NATIONAL-STANDARD COMPANY
Reynolds Division
Dixon, Illinois



PUNCH COMPLICATED PATTERNS FAST

With the new improved STRIPPIT 15-A Fabricator, complicated patterns of round and shaped holes can be produced quickly and accurately in sheet material. A high speed punch press that enables you to produce finished pieces directly from drawings, the versatile STRIPPIT 15-A eliminates slow "in-between" tool designing and die making... saves you days or even weeks of valuable time.

The STRIPPIT 15-A features a unique multiple-stop gauging system for positioning work to exact layout specifications. Punches and dies... within easy reach in built-in file drawers... can be switched from one size to another in less than 20 seconds. Designed especially for prototype and short production runs, the STRIPPIT 15-A is easily converted to a high speed production punching unit with the STRIPPIT duplicator.

The STRIPPIT 15-A:

- **PUNCHES** any round or shaped hole up to 3½″ diameter. Maximum material thickness is ¼″.
- **NOTCHES** 90° corners—rectangular, radii, vee and special shape edge notches—up to ⅛″ capacity in mild steel.
- **NIBBLES** straight line or contour shearing up to 38″ diameter circle, at 165 strokes a minute, ⅛″ mild steel.

Send now for 15-A catalog. Free demonstration can be arranged right in your plant.

WALES **STRIPPIT** INC.

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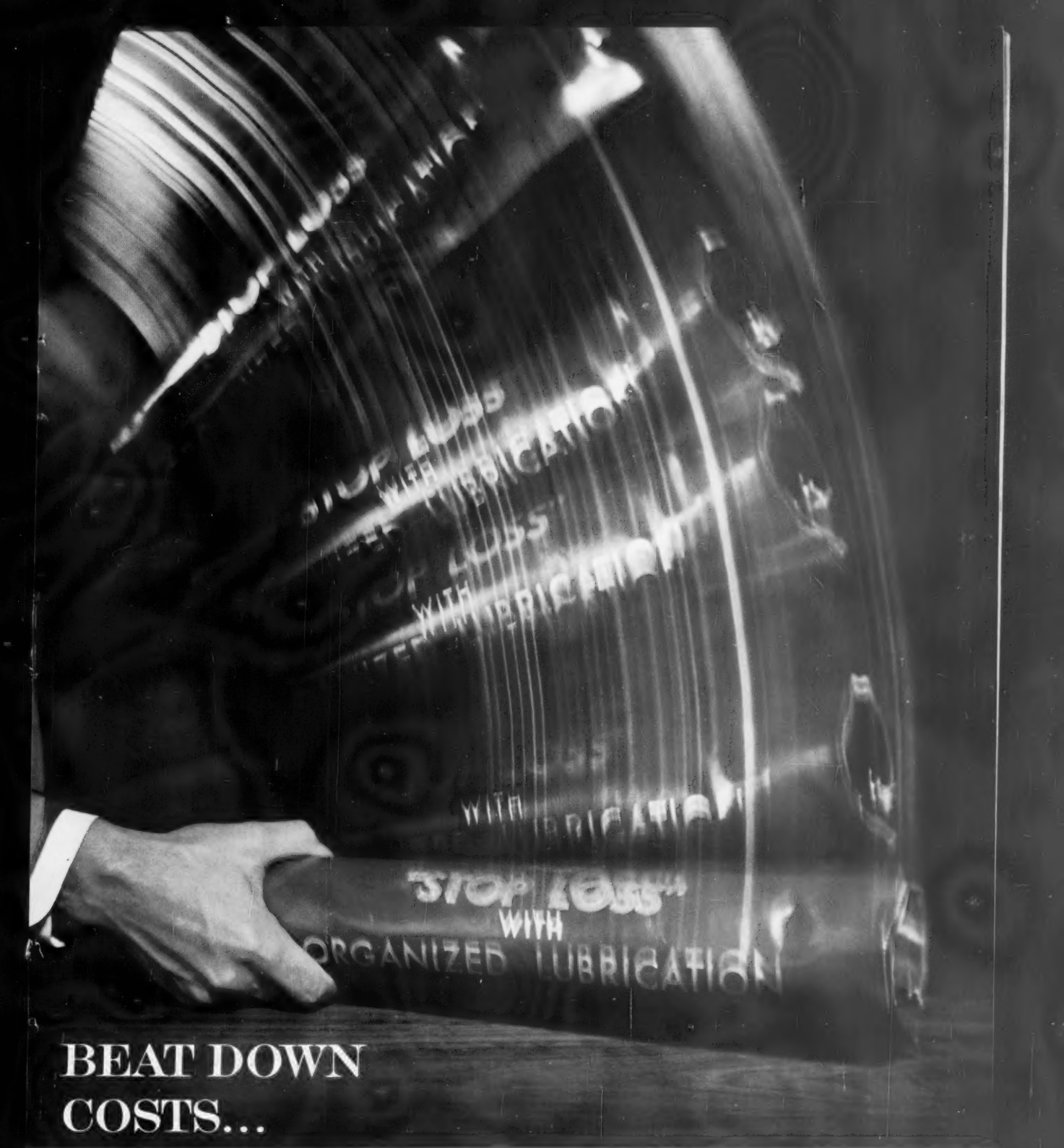

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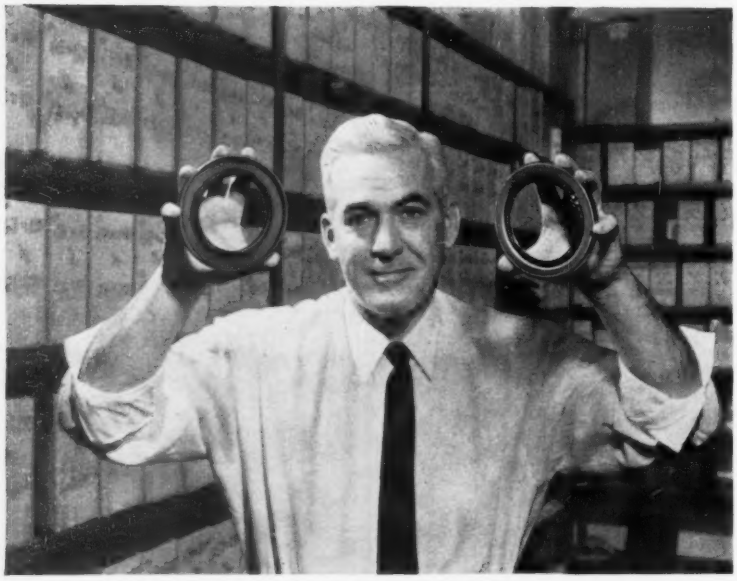
FOR UP TO 4% MORE NET PROFIT

The Texaco man has a weapon widely used by management caught in a profit squeeze. It's Texaco's "Stop Loss" Program—a new concept of cost control through organized lubrication. Right now, this plan is helping manufacturers everywhere to save. Find out how it can help you cut your maintenance costs by as much as 15%—add as much as 4% to net profits. Write for our informative folder: "How to Starve a Scrap Pile." **TEXACO** INC., 135 East 42nd Street, New York 17, N. Y. Dept. S-211

ENGINEERED OIL SEALS

from Your Local Bearing Distributor



For positive bearing protection specify high-quality Garlock KLOZURE Oil Seals from one of the listed authorized bearing distributors.

NOW—you can draw from over 1800 standard stock items of Garlock KLOZURE* Oil Seals, and enjoy "off-the-shelf" delivery from the nearest of these authorized distributors:

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GARLOCK

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Canadian Div.: Garlock of Canada Ltd.

Plastics Div.: United States Gasket Co.

Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products

*Registered Trademark

This mark tells you a product is made of modern, dependable Steel.

"T-1" Steel cuts spiral case weight 45% at Oahe Dam

Oahe Dam will be the world's largest rolled earth dam . . . 9,300 feet long and 242 feet high. It will create a lake 250 miles long on the Missouri River above Pierre, South Dakota. Seven hydro-generators will have a total installed power capacity of 595,000 KVA.

USS "T-1" Steel cuts weight of spiral cases. Water for power generation will flow through seven spiral cases with inlet diameters of 20½ feet. USS "T-1" Constructional Alloy Steel not only met all requirements, but permitted a reduction of about 45% in the weight of the steel used. The total amount of USS "T-1" Steel used was 1,002 tons.

Cost Savings. By using USS "T-1" Steel, with a minimum yield strength of 100,000 psi, plate thicknesses ranged from ½" to 1¼". With carbon steel, they would have been almost twice as thick. Result: large savings in freight costs, erection time, and field welding costs. In future projects, costs might be reduced even more by the use of our new, more economical USS "T-1" type A Steel which has the same strength.

Giant steel tunnel liners, 24 feet in diameter and averaging 2,200 feet long, will carry water for power generation. 20,000 tons of structural carbon steel were used by U. S. Steel's Consolidated Western Steel Division to fabricate 449, 30-foot-long sections for the seven tunnel liners.

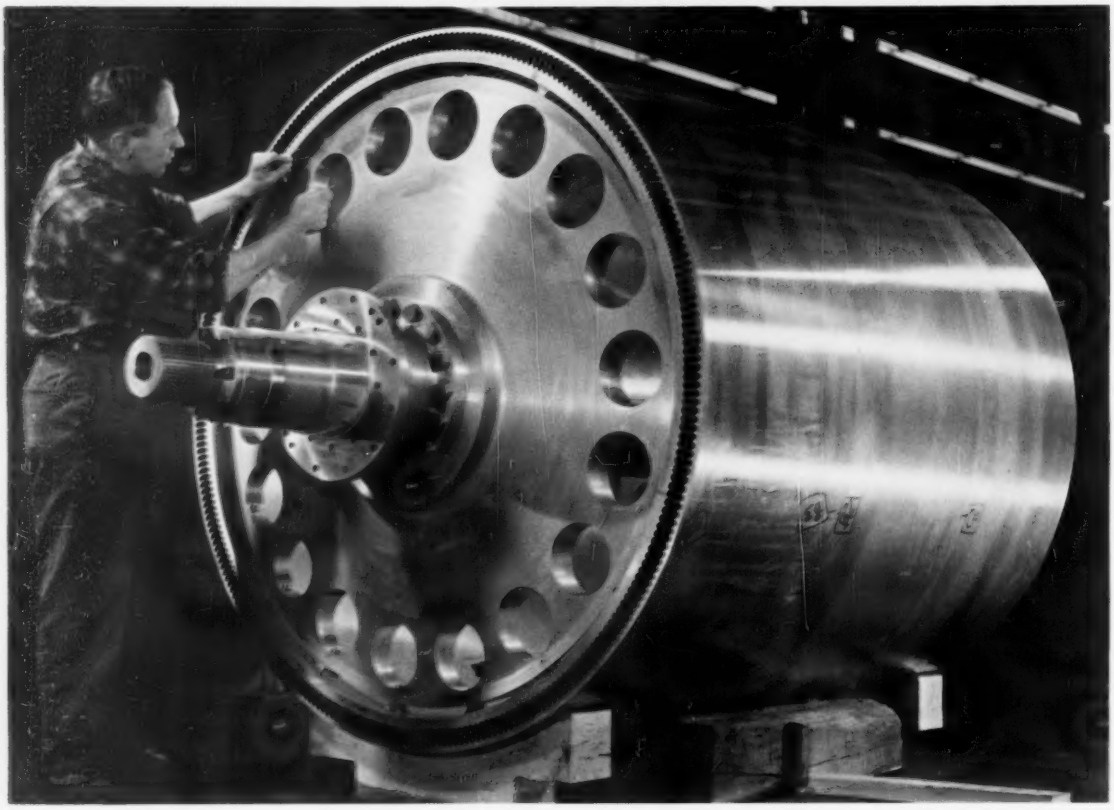
The Oahe Dam is being constructed under the supervision of the Corps of Engineers—U. S. Army, Office of District Engineer, Omaha, Nebraska. Powerhouse A-E: Sverdrup and Parcel. Powerhouse contractor: Atkinson-Ostrander Company. Spiral cases were fabricated by the Hydraulic Division of the Allis-Chalmers Manufacturing Company (the supplier of completed turbines), and field-welded and assembled by Chicago Bridge & Iron Company. Generators were supplied by General Electric Company.

For more information write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

United States Steel

Rough-machined ring and forged ring being sawed at our Homestead Works.
Three-ring rotor, showing rectangular holes through ring wall, with end plates and tubular spindle assembled into a unit ready to ship.



How to bring a missile back through temperatures to 8,500°F

You can broil a steak at 350°F. Pure iron melts at 2795°F. Most meteorites burn up when they enter the earth's dense atmosphere. Today, man is firing missiles to meteoric altitudes—but the problems of tolerating the extreme temperatures of re-entry have been the greatest challenge to his ingenuity.

One of the major obstacles to simulating re-entry conditions was how to produce for realistic time durations pure air in large volumes at meaningful temperatures, pressures and velocities. This problem is being solved with the *Wave Superheater*—an innovation in hypersonic wind tunnels. Temperatures to 8500°F, pressures to 200 atmospheres and velocities up to Mach 15 can be attained with this facility. Cornell Aeronautical Laboratory has devised this equipment to test full-scale missile components in the laboratory.

The wave superheater is essentially a blow down system using a rotor with 288 tubes (passages) drilled into its periphery. The shock tubes are charged with air; then a driver gas (helium) at a pressure of 1500 psi is released through one end of each tube, successively superheating by shock waves the air which is then collected and expanded into the wind tunnel. The rotor operates at a maximum temperature of 800°F; each tube is momentarily cooled as it rotates, to be ready for the next charge.

Rotor Ring Forgings. The heart of the superheater is the rotor made from three USS Stainless W forgings. The rough-machined rings are each 63" OD, 54" ID, 23½" long and weigh 6,000 pounds each. USS Stainless W was chosen for this demanding application because of its precipitation hardening characteristics, and its ability to retain the required high strength at the operating temperature.

The three rings were obtained from a 59" diameter ingot, which was cogged, sheared, upset-forged, punched and finally mandrel-forged under our 10,000-ton press. After rough machining and completing the inspections called for, the rings were shipped to 20th Century Machine Tool Company, Utica, Michigan, who drilled and broached the holes seen in the assembled view of the three-ring rotor. With an assist by Hoover Tool & Die Company, Warren, Michigan, the final machining and assembly was completed in 10 months.

No matter what kind or size of USS Quality Forgings you need, you get the advantages of the finest steel, the most modern equipment and the most skilled forging men in the world. Address inquiries to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. A copy of our booklet "USS Nuclear Forgings" may be secured by writing to the same address. USS is a registered trademark.

United States Steel Corporation · Columbia-Geneva Steel Division · Tennessee Coal and Iron Division · United States Steel Export Company

USS TRADEMARK **United States Steel**

55555-2

Huge Cleveland bridge combines USS High Strength and Carbon Steels to save weight and reduce costs

The new $18 million, 8-lane Cleveland Inner Belt Freeway Bridge is 116 feet wide and 4,223 feet long. It can handle 95,000 vehicles a day. The $8,130,000 contract for superstructure erection was the largest single contract every awarded by the Ohio Department of Highways.

The bridge spans the Cuyahoga River, a dock area, two major highways, a railroad freight station, numerous tracks and industrial buildings. This made adequate clearance a major problem which USS High Strength Steels helped to solve.

Where the designers specified high-strength low-alloy steel in the highly stressed members, the fabricators used USS MAN-TEN (A440) and USS COR-TEN High Strength Steels. These steels each have a minimum yield point of 46,000 psi (or, recently, 50,000, to 1½" for USS COR-TEN Steel) and permit a design stress of 24,000 compared to 18,000 psi for A7 steel. Weight was reduced by as much as 25% in many truss members. This made USS MAN-TEN (A440) a cheaper steel to use than A7 carbon steel in cases where weight reduction amounted to 17% or more. Where A7 carbon steel would do the job less expensively, it was used.

Nearly 21,000 tons of steel went into the completed bridge and approaches. Of this, 8,012 tons were USS High Strength Steels, 12,261 tons were A7 steel and the rest was miscellaneous castings and forgings.

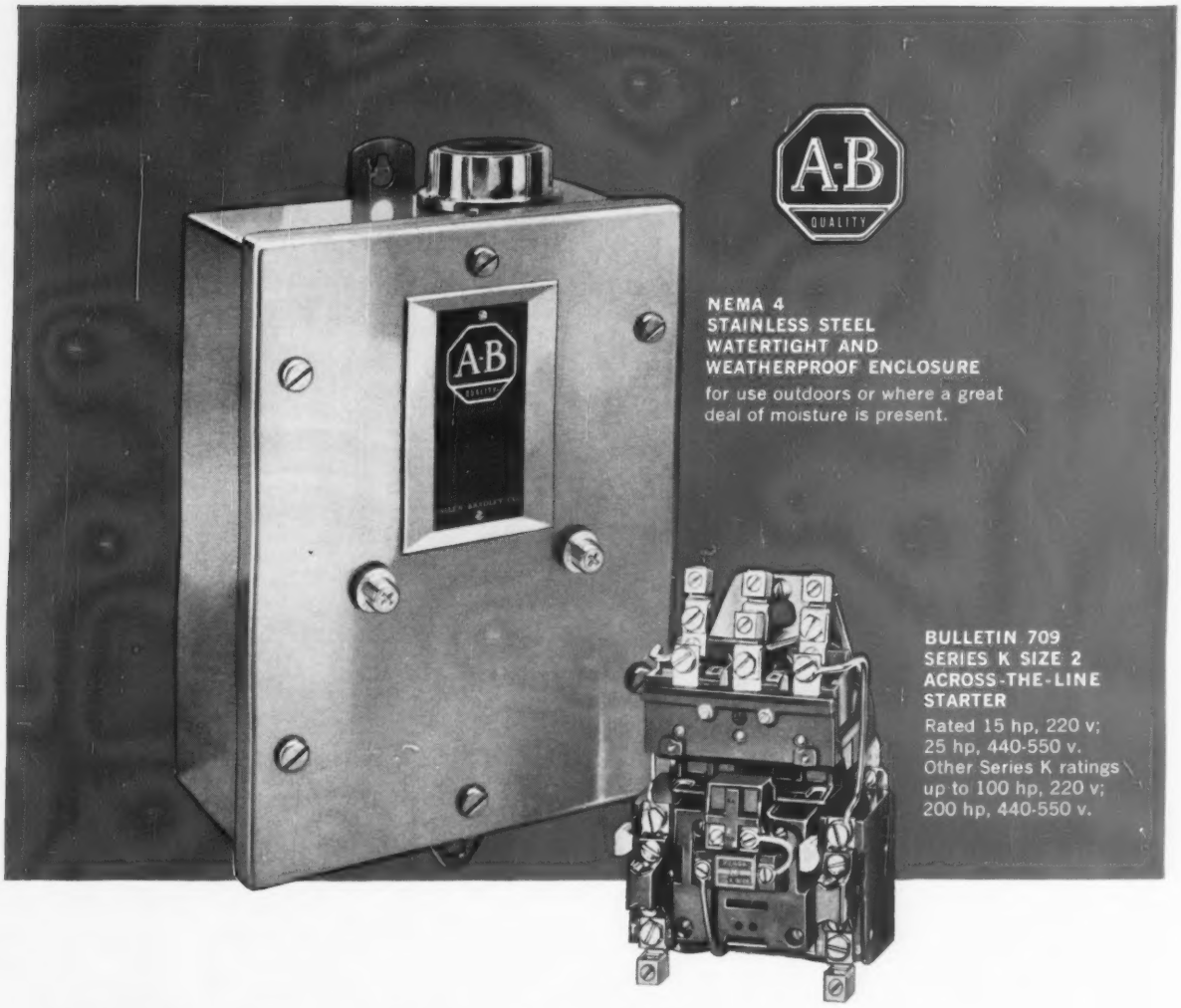
The new concept of combining steels of various strength levels for bridges, buildings and heavy industrial equipment is gaining wide acceptance. You can save substantial amounts of money, cut dead weight and obtain more durable structures by using the *right steel for the job!*

For more information on the USS "Family of Steels" for design, write to United States Steel, Room 6433, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, COR-TEN and MAN-TEN are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

United States Steel USS

Cleveland Inner Belt Freeway Bridge is part of the Interstate Highway System. **Consulting Engineer:** Howard, Needles, Tammen & Bergendoff, St. Louis. **General Contractor for Main Bridge:** John F. Beasley Construction Company, Chicago. **General Contractor for East Approaches:** Horvitz Company, Cleveland. **General Contractor for West Approaches:** National Engineering and Contracting Company, Cleveland. **Structural Steel Fabricator for Entire Bridge:** Fort Pitt Bridge Works, Pittsburgh.



The New Size 2 Motor Starter

Uses ONLY HALF the Space, and Yet—

It's good for MANY MORE MILLIONS of OPERATIONS

Impossible—you may say! But, it's true. You'll find unbelievable reliability and much longer, trouble-free life packed into these new, surprisingly small Allen-Bradley Series K starters. For instance, the above open-type Bulletin 709 Size 2 uses 51.0% less panel space than the previous Bulletin 709 starter—and it, too, was thought of as a small starter! Higher ratings in the new A-B line offer similar space savings.

You're certain to be interested in many other Series K features, such as the new weld-resistant double break contacts of cadmium oxide silver . . . new built-in "extra" interrupting capacity . . . new cushioned high-efficiency magnet . . . new pressure molded coil . . . new permanent air gap . . . new trip-free and tamperproof solderpot overload relays. Then, too, there's the new modern family of enclosures for every operating condition. Styled by Brooks Stevens, they give every installation an eye-appealing, business-like beauty. For more details please write for Publication 6100: Allen-Bradley Co., 1320 S. Second Street, Milwaukee 4, Wisconsin.

ALLEN-BRADLEY

Quality Motor Control

Member of NEMA

Steel . . . serves you every day in a thousand ways

Here's a real sleeping beauty!

We're talking about the wire in the bed spring at left. It's Gamma Spring Wire—the sworn enemy of the kind of insomnia caused by lumpy mattresses. This quality wire, one of the many types manufactured by CF&I, has the resiliency and shape-retention characteristics that help produce more comfortable, longer lasting bedding and furniture springs.

CF&I's Gamma Spring Wire can be tailor-made to stop spring-coiling problems *before* they begin. If, for example, you use electrical stress-relieving units in your automatic coiling and knotting operations, we can supply Gamma Spring Wire with a special finish to prevent electrical arcing. And for applications that subject wire to severe crimping and clinching, there is a Gamma Spring Wire to meet your requirements.

A CF&I engineer will be happy to study your operation and recommend the type of wire that will do the best job at lowest cost. Call your nearby CF&I sales office for complete details.

Other CF&I Upholstery Wires include Round High and Low Carbon Wire for borders and braces, No-Sag Furniture Wire, and Zig-Zag Spring Wire for car upholstery.

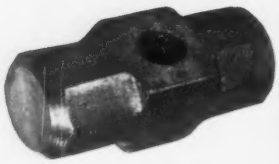
0533

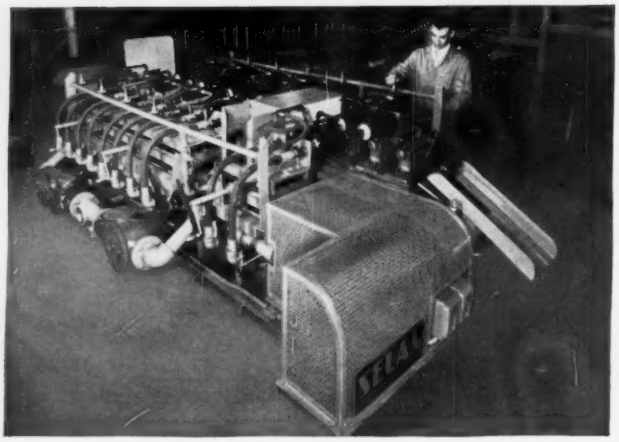
The Colorado Fuel and Iron Corporation
Denver • Oakland • New York
Sales Offices in Key Cities

CF&I STEEL MADE IN U.S.A.

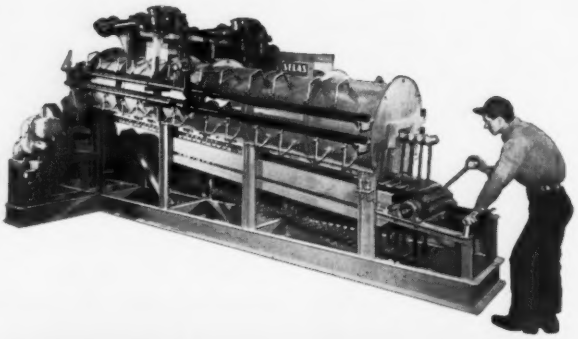
NEW SLANTS ON HEAT PROCESSING FROM SELAS

here's how industry cuts costs... Selas Heat Processing





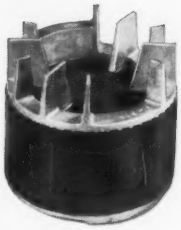
SELECTIVE HARDENING: *Both faces of sledge-hammer-heads are selectively hardened and tempered in a continuous operation. Tempering, previously requiring hours, now performed in minutes. Machine handles wide variety of sizes and shapes of heads. Integration with preceding grinding step enables operation of machine with no additional labor.*



HEATING FOR FORGING: *Brass slugs — ⅞ to 2" diam., 2½ to 8" long — are heated to 1390°F in this automatic machine at high production rates. Selas fast, uniform heating produces fine grain size, improved physical properties.*

ANNEALING: *Unique Selas gas-fired machine anneals brass door knob blanks — automatically in the production line — as part of a completely integrated manufacturing process. Selas Superheat burners fire a narrow jet of high velocity, high temperature gases at a 1⅜ in. band on sidewall of blank. Annealing, cooling and discharge, accomplished in 9 sec, are geared to production line output of 60 finished knobs each minute. Fast Selas heating by non-oxidizing combustion gases achieves a cleaner, brighter end-product . . eliminates need for muffles or prepared atmosphere.*

improves product quality with Equipment



POST HEATING: *Die-cast aluminum rotors for electric motors are post-heated in this continuous, automated Selas machine, to improve electrical characteristics. Occupying floor area only 7 feet square, this machine provides also a fast, convenient method for shrink-fitting rotors to shafts, and replaces both manual heating and a press-fitting operation.*

These installations are typical of how Selas *automated* heat processing equipment

- Cuts operating costs
- Increases production rates
- Minimizes in-process inventory
- Reduces labor requirements
- Saves valuable floor space
- Improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas automated heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. A Selas field engineer would welcome the opportunity to survey your requirements . . . at your convenience. No obligation, of course. For this free personal service, or for literature on any of the heating operations shown here, write to Mr. W. B. Troupe, General Industry Division.

SELAS CORPORATION OF AMERICA
212 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A. Pregny, Geneva, Switzerland.
INTERNATIONAL AFFILIATES—Australia, Benelux, Canada, England, France, Germany, Italy, Japan, Portugal, Spain.

SELAS

HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT
•
DESIGN
•
CONSTRUCTION

Cosco Stools, Tables, Carts are . . .

"Made Like A Million" with Pittsburgh Steel Sheet

Make your products "like a million" and you'll sell them by the million.

That's the philosophy practiced at Hamilton Cosco, Inc. of Columbus, Indiana, manufacturer of nationally known Cosco brand tubular steel frame household and juvenile products and office chairs.

And the philosophy has paid off.

Introduced 16 years ago, Cosco household stools have averaged nearly a million units a year. Their success led to development of other popular Cosco products ranging from baby jumpers to executive office chairs.

Pittsburgh Steel Company plays an important part in Hamilton's success by supplying substantial quantities of cold rolled sheet that consistently meet Cosco's ultra-critical requirements.

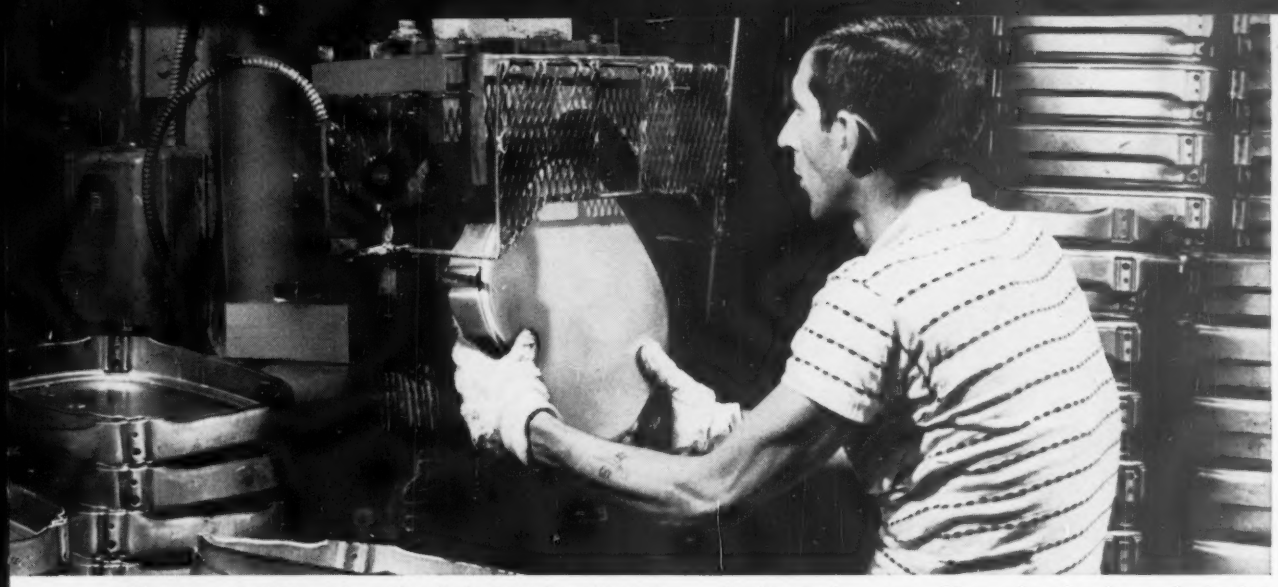
For, at Hamilton there's no such thing as a "second" in a finished product, be it serving cart or stool, playpen or folding bridge chair. The slightest imperfection — in forming, bending, painting or plating — requires reprocessing or scrapping of the defective item.

Supplying cold rolled sheet that faithfully meets such air-tight quality control places unusual responsibility on the steel supplier.

But, Pittsburgh Steel regularly meets this obligation with sheet known throughout the metalworking industry for its three "F" qualities:

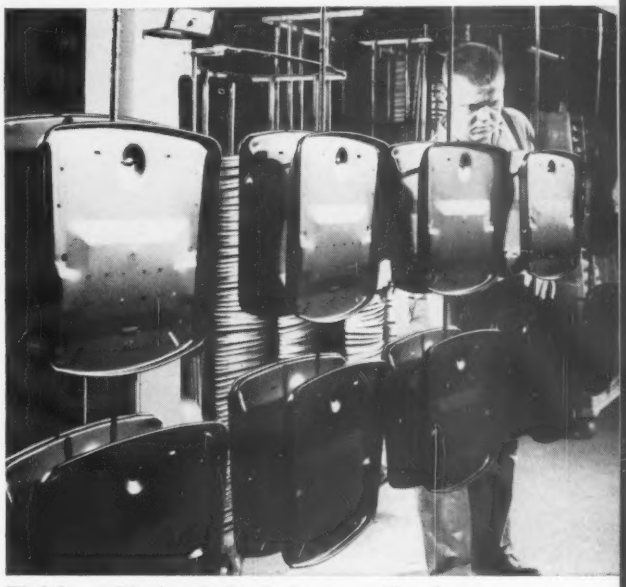
- **Flatness** — for exposed surfaces where appearance is vital and for fast production on automatic and semi-automatic equipment.
- **Finish** — dense, exceptionally clean surface for critical finishing operations, particularly Hamilton's electrostatic painting process.
- **Formability** — for precise uniformity in stamped, drawn, rolled or bent shapes; and especially for non-fluting characteristics in difficult bends on electric-welded tubing rolled

◀ The three "F" features of Pittsburgh Steel sheet—**flatness, finish, formability**—show up in assembly of the popular Cosco "Hour Glass" step stool. Gleaming backrests, gracefully curved tubular legs and brackets, seat pans and fold-away steps, all reflect quality of Pittsburgh cold finished sheet.



Flatness of Pittsburgh cold rolled sheet is critical for appearance, rigidity of stool seat and for trouble-free production in long runs. Here, after forming and piercing, raw edges are turned under.

Formability of Pittsburgh Steel sheet is demonstrated here as ¾ inch tubing, rolled from slit sheet, takes severe bends and deformation required for backrest brackets. Non-fluting quality of steel on radius of bends is vital on this and all other tubular parts produced by Hamilton Cosco, Inc.



Finish of Pittsburgh Steel sheet provides dense, exceptionally clean surface for tight, smooth paint adherence required by Hamilton's electrostatic painting process. Seat pans for Cosco's unique gatefold card table chairs show painting quality of steel.

from Pittsburgh Steel sheet.

H. E. Spurgeon, purchasing agent, said:

"The company's success is based on its insistence on absolute quality of its products—and that means quality starting with raw steel. We do many things merely because it's the best way.

"Performance of Pittsburgh sheet is very good, we've found. Over-all, I'd say Pittsburgh Steel is a very satisfactory supplier."

Pittsburgh Steel Company sheet—the steel with the three "F" qualities—can help step up your product quality, too, whether you're using hot rolled or cold rolled, sheet widths or strip widths. Contact one of the Pittsburgh Steel Company District Offices listed here. We'll match the steel to your product.

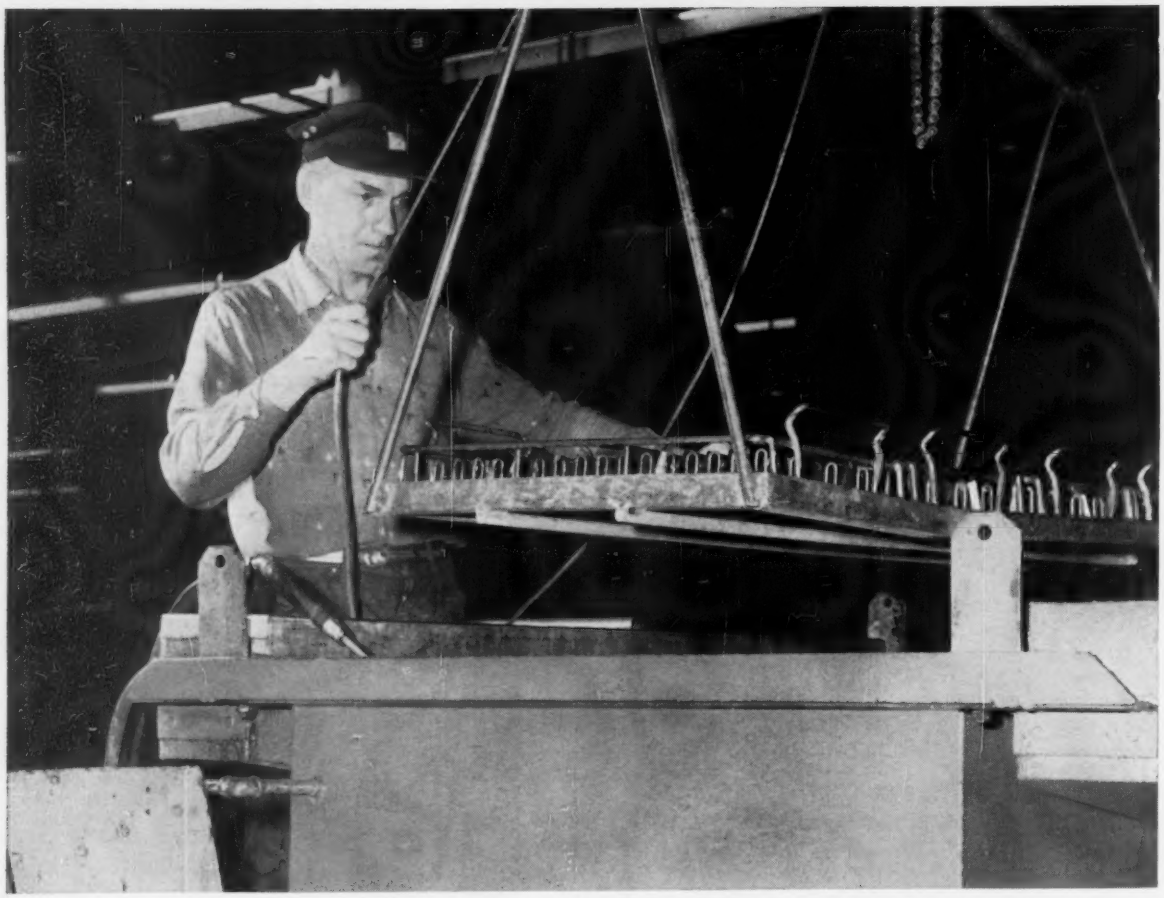
Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

Steel



WHERE HOOKER TRICHLORETHYLENE RAISED QUALITY AND LOWERED COSTS

Approximately a year ago, the Metals Processing Division, Curtiss-Wright Corporation, began using high-quality Hooker NIALK® TRICHLORETHYLENE to degrease jet engine blades. Before this, maintaining purity in the baths required frequent cleanouts. Chemical costs were high.

Immediate results with Nialk showed a better cleaning job and tighter quality control. Down time for degreaser maintenance has been substantially reduced.

The exceptional cleaning results now obtained permit inspectors to discover possible flaws more easily. Maintaining quality is far less difficult.

The stabilizer in Nialk TRICHLOR contains *psp*—permanent staying power—which enables the stabilizer to operate efficiently until cleanout. After cleanout, the solvent is distilled for further use in other operations.

Curtiss-Wright officials say that the assistance they obtain from Hooker technical experts in preventing waste is most important, since they are working with costly metals. Because the degreasing baths have never turned acid, problems in keeping their quality at a high level and the necessity to run tests have been reduced. Whatever your degreasing job or the type of metal you're processing, Nialk TRICHLOR can give you a greater volume of work and reduce your costs, as well as provide a smooth-running operation.

Contact your nearest Hooker Chemical Distributor for information. Or write us. We will be glad to help you with any problems.

HOOKER CHEMICAL CORPORATION

1212 UNION STREET, NIAGARA FALLS, NEW YORK

HOOKER CHEMICALS PLASTICS

Sales offices: Buffalo, Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B.C.

N-S Spring Wire...

The complete line—engineered for reliability—precision drawn stainless steel wire, music spring wire, flat wire and strip, superalloy wire, heavy galvanized wire, plated wire, rocket wire (extra high tensile). Other wire specialties and experienced National-Standard engineering service help meet your special requirements.

NS
NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD COMPANY
Niles, Michigan

Test it yourself and see. AO "Fyre-Free" meets ASA requirements for flameproofed fabrics. It may smoke, but will not support combustion.

Use it against sparks or light metal splash . . .

AO "Fyre-Free" Clothing Won't Support Combustion

Take any job in the plant with exposure to heavy sparks or light metal splash . . . that's the place for AO "Fyre-Free" protective clothing. Treated with a permanent type of flameproofing, "Fyre-Free" won't smolder — no after-flame or afterglow. It can be washed as many as ten times and still come back for more because the flame-resistant properties stay with it.

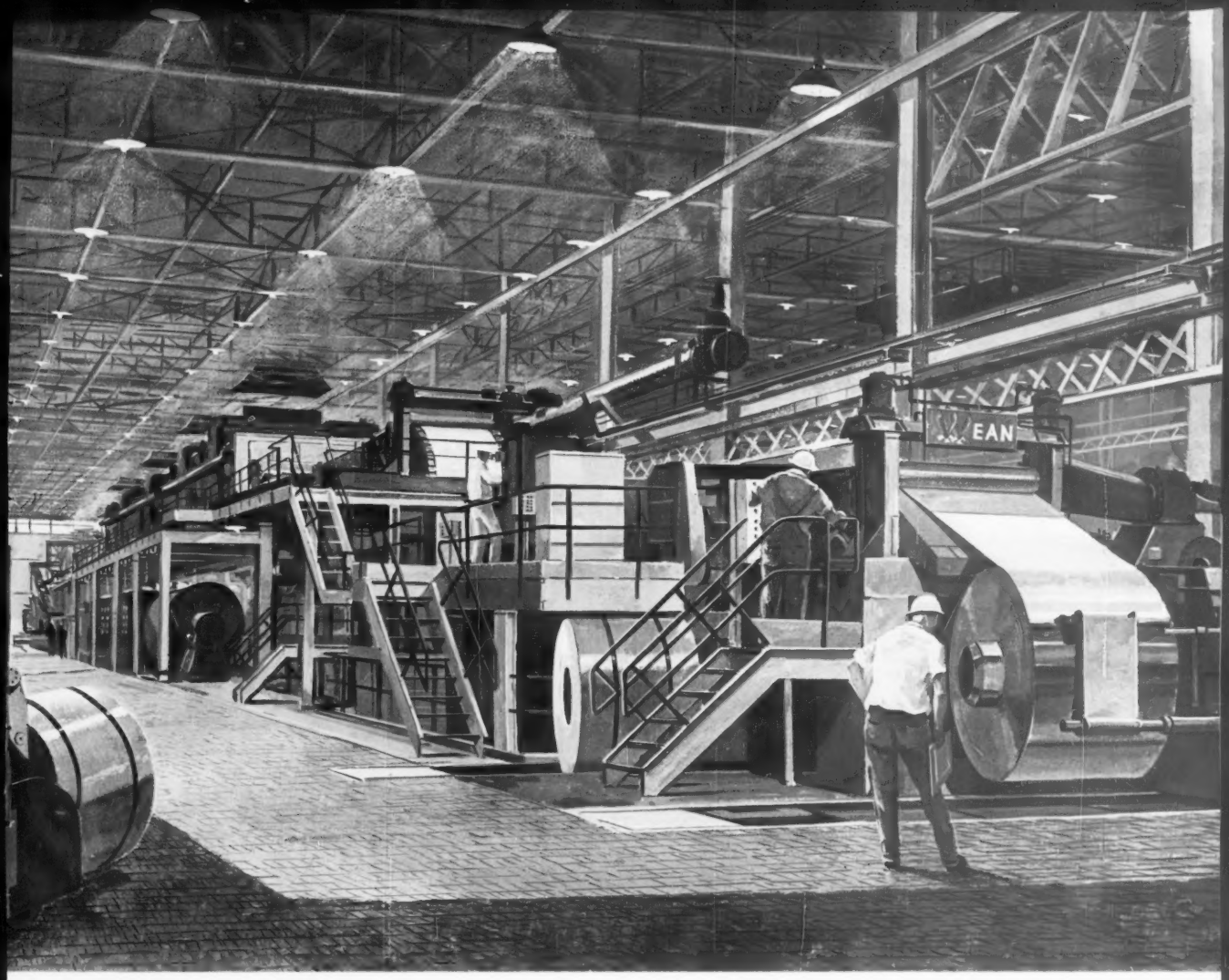
This 100% cotton cloth is light in weight . . . with good tensile strength in both warp and fill . . . yet it has the soft feeling of untreated fabric that workers like. "Fyre-Free" clothing is mildew-resistant, does not deteriorate in damp climates or operations.

You can get a full line of "Fyre-Free" coats, pants, coveralls, overalls, sleeves, cape sleeves, aprons and hip leggings. For details and prices, consult your AO Safety Products Representative.

Your Surest Protection . . . AO SURE-GUARD Clothing

American Optical
COMPANY

SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS



PORTRAIT OF PROGRESS: *Wean Annealing and Pickling Line at Armco Steel Corporation's Butler Works*

Wean Line Part of Armco's Expansion into Wider, Closer Tolerance Stainless

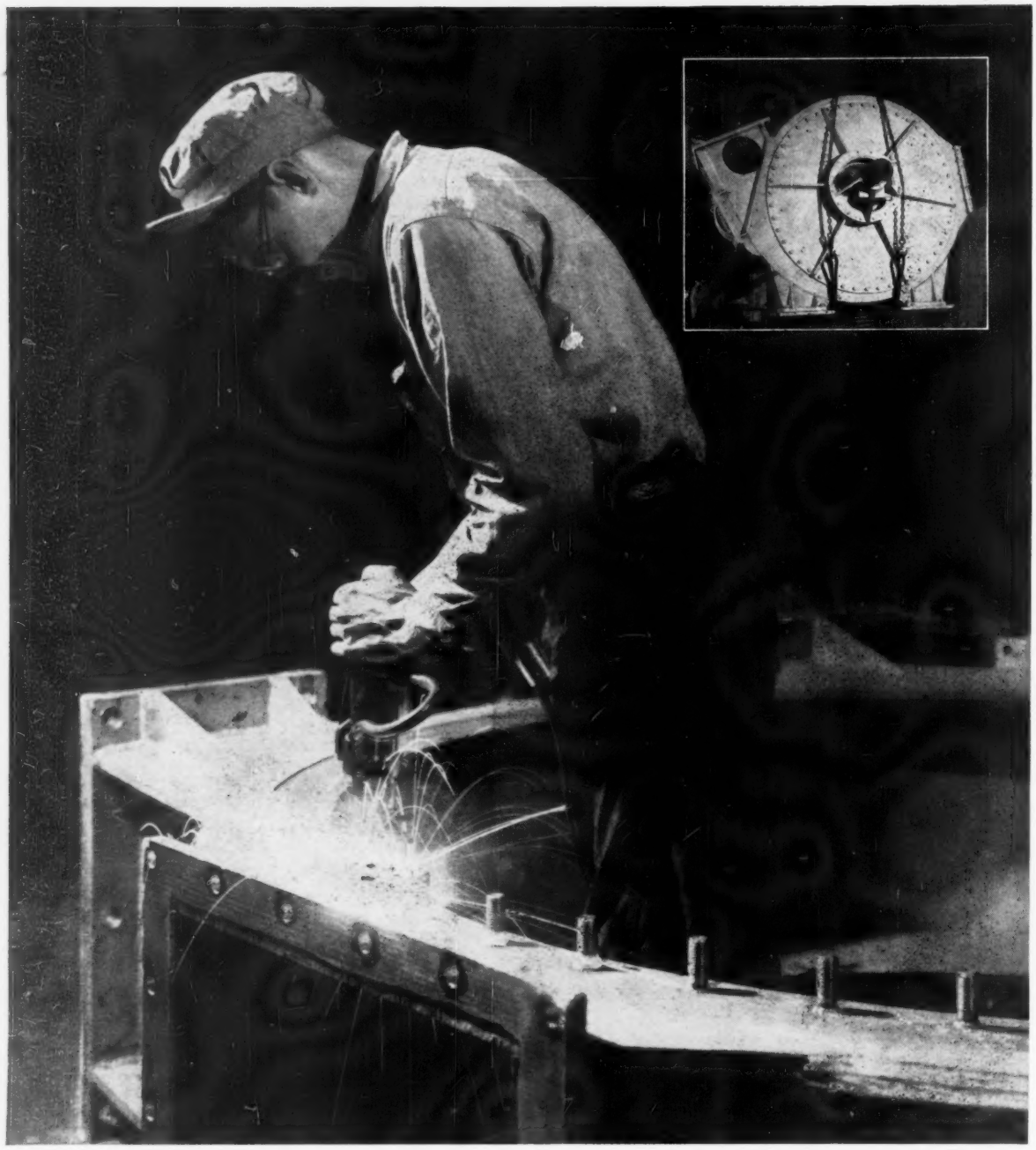
Over the past ten years, Armco Steel Corporation has carried on a multi-million dollar expansion and modernization of its Butler, Pennsylvania plant facilities. One of the latest projects boosts the plant's production of flat-rolled stainless steel, providing customers with wider, closer tolerance stainless sheet and coils.

A vital part of this program is represented by the Wean stainless annealing and pickling line illustrated. This line is unique, in that all processing sections are installed above floor level. Above-ground design facilitates inspection and maintenance of the furnace section, acid tanks, and drive mechanisms.

Armco's new Wean line is capable of handling 30,000-pound stainless steel coils from 24″ to 52″ in width and from .010″ to .080″ in thickness. The line operates at speeds up to 150 feet per minute. An even flow of materials is maintained in the processing section by two pay-off reels that permit rapid joining of coils.

The Wean "creative engineering" that resulted in these new design features has also been part of the development of annealing facilities for every major steel producer. This background of research and development is ready to help you solve your production and modernization problems.

THE WEAN ENGINEERING COMPANY, INC. · WARREN, OHIO



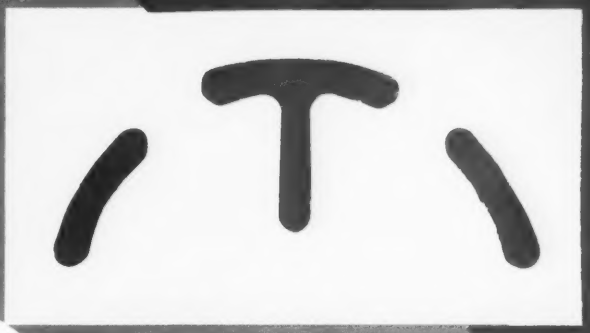
FASTENING TIME CUT 80% WITH NELSON® STUD WELDING

Bearing plates for these 9-ton coal pulverizer exhaust casings are fastened 80% faster with Nelson Stud Welding... and expensive material handling is eliminated. Threaded studs, ⅞" in diameter, are end-welded at a rate of 4 to 5 per minute. That's real speed—especially when compared to the 2 to 4 minutes each it takes to drill, tap and set threaded stud bolts. It's easy to see how Nelson Stud Welding cuts costs, increases production. With stud welding, all the work is done on one side—without warping or damage. Heavy bosses are not needed since there's no need to provide tap depth. And because there are no holes in the base material, there is no possibility of leaks in water and oil-tight units. Take the tool to the work... get greater design flexibility and lower material handling costs. Nelson studs are available in diameters from ¼" to 1" for all types of applications.

For application ideas, design recommendations and full method information, send for the Nelson "Design Manual". **NELSON STUD WELDING,** Division of Gregory Industries, Inc., Department **S,** Lorain, Ohio.

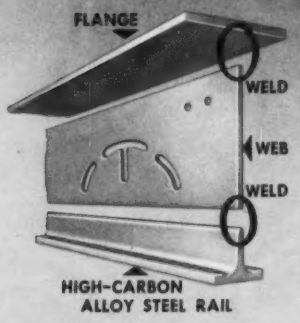
GREGORY INDUSTRIES

Introducing a NEW IDEA in track design



TARCA TRACK

A TRULY SUPERIOR OVERHEAD MATERIALS HANDLING TRACK



Integrally Welded

Automatic welding machinery especially developed for Tarca Track fabrication assures reliable welds. Top flange, web, and high-carbon steel rail are joined by continuous welds to form a one-piece dependable unit.

Tarca Track—an outstanding, new Cleveland Tramrail development. Different from all other overhead materials handling tracks. Result of years of extensive research and testing.

Tarca Tracks are straight and accurate. Not subject to distortions and broad dimensional variations of ordinary tracks fabricated from standard mill beams.

Tarca wearing rails are hard. Made of high-carbon alloy steel integrally welded into a composite track section.

Tarca running treads are flat, raised, smooth. Enable easiest load movement —provide extra wear—prevent peening.

Tarca Tracks have great rigidity because all welds are continuous.

Tarca Tracks are faster, easier to erect. Greater track accuracy simplifies installation. New support fittings save erection time—facilitate track leveling —provide flexibility to relieve stresses from alignment variations.

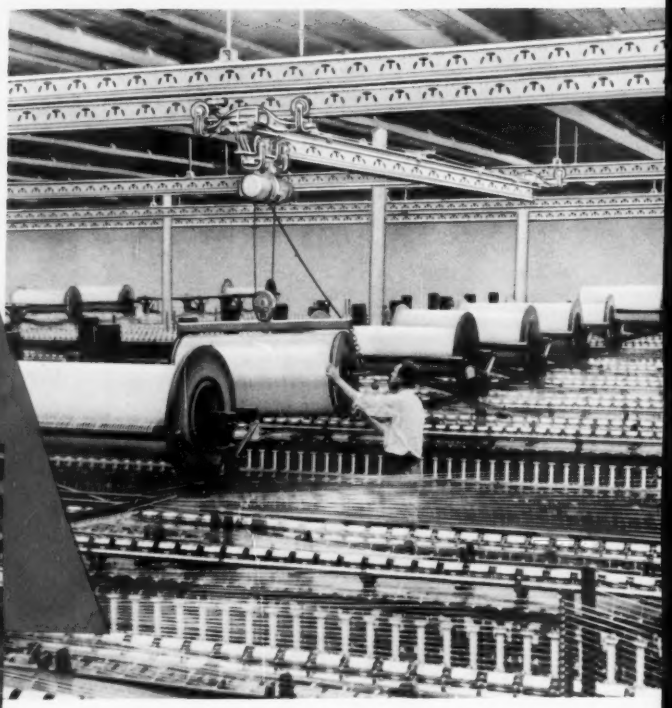
Ten Standard Sizes—Tarca Tracks range from 8 to 20 inches in depth. Special sizes can be made to suit unusual requirements. Track parts easily proportioned to provide balanced design for any load condition.

Ask for this helpful booklet—No. 2032

Covers all major features the buyer should know about overhead materials handling equipment. Has complete story on Tarca Track. Contains detailed equipment specifications and handy proposal evaluation form.

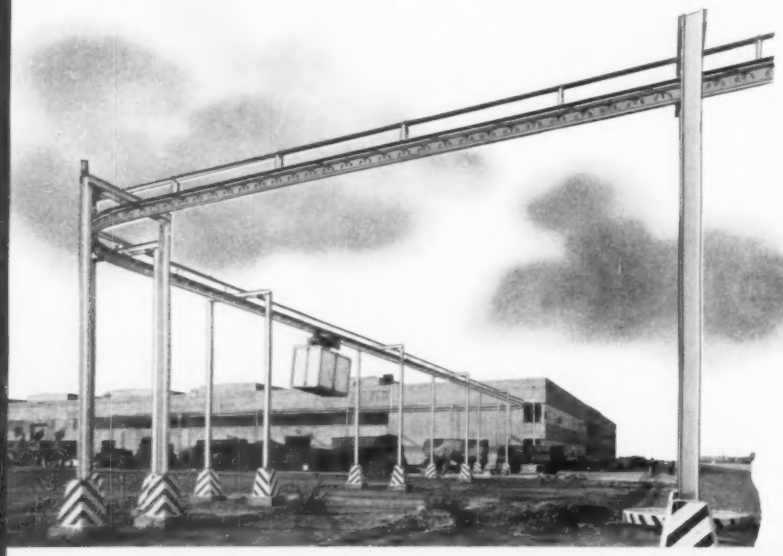
CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
5899 EAST 284th STREET · WICKLIFFE, OHIO

Trade-mark of durability and strength
—punched into all Tarca Tracks.



Many hundreds of textile mills have depended for decades upon Cleveland Tramrail for a great part of their materials handling equipment. Illustrated is a Tarca Track crane system handling twister beams.

Nearly all of the great American and Canadian automotive plants have installations of Cleveland Tramrail. Many include thousands of feet of track and hundreds of cranes.

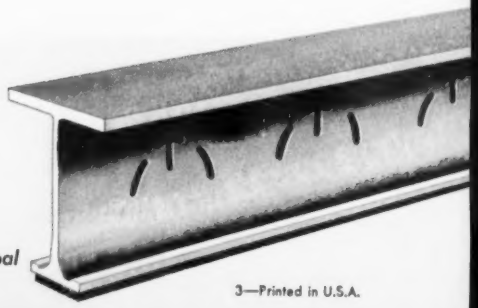


Cleveland Tramrail is a leader in automatic materials handling. A great variety of installations are in service. They operate between two or more points on the same or different elevations, or between buildings, as illustrated. One system serves 126 stations.

Your Cleveland Tramrail Sales Engineer is Qualified to give you the Complete Design and Application Story on This Revolutionary

NEW TARCA TRACK

Cleveland Tramrail is represented by competent, experienced engineers in all principal cities of the United States and Canada. Contact address on other side.



3—Printed in U.S.A.

The pioneer western producer of quality

SODA ASH

expands to Wyoming

The consistently high quality soda ash and dependable service provided by the West End Division to western industry for over 36 years from its California plant will be offered in a greatly expanded area on completion of the new Stauffer plant in Wyoming at the site of vast, natural soda ash deposits. Let us suggest practical ways bulk or bagged soda ash can be supplied economically from Stauffer's multiple source to your point of consumption. Simply address the coupon below and mail.

Stauffer CHEMICALS

WE ARE INTERESTED IN KNOWING THE BENEFITS TO US OF STAUFFER AS A SODA ASH SUPPLIER.

YOUR NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Please mail to West End Chemical Co., 636 California Street, San Francisco, Calif.

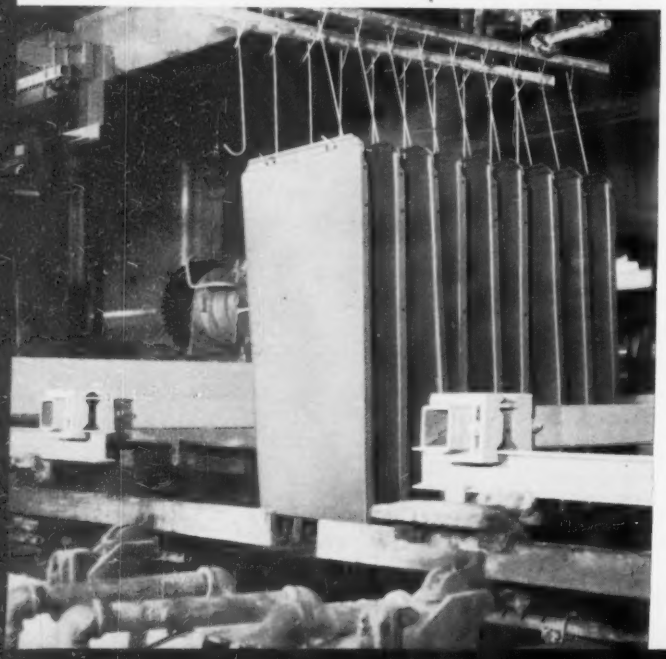
WEST END CHEMICAL COMPANY • DIVISION OF STAUFFER CHEMICAL COMPANY

SAN FRANCISCO, 636 CALIFORNIA STREET • CHICAGO, PRUDENTIAL PLAZA • ST. LOUIS 19, P. O. BOX 48

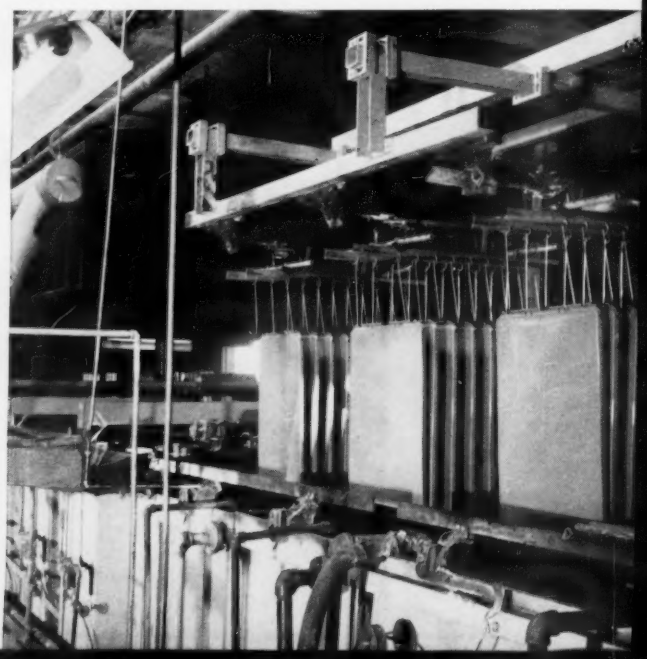
Steel *for Strength . . . Economy . . . Versatility*

Assembly of Roper's 30-inch ranges takes place under modern production conditions. Single-coat finish on Bethnamel panels greatly reduces hazard of chippage during assembly.

Stove side panels 22 1/8 in. x 36 in. receive a 24-minute pickle in 7 to 9 per cent H_2SO_4 at 160-175 deg F. This bath is designed to hold metal removal to a minimum of 2 gr per sq ft.



After thorough rinsing, the Bethnamel panels pass through a 15-min. nickel flash of 150/165 deg F temperature, at an operating pH of about 3.5.



Roper gets 84% acceptance on first fire in direct-on enameling Bethnamel panels

Single coat lowers processing costs, cuts chippage in assembly

At Kankakee, Illinois, the George D. Roper Corp. turns out a range that's a household word among women who cook with gas. To the Roper people the ranges now look better than ever, thanks to their successful direct-on enameling of Bethnamel sheet steel.

One-Coating Cuts Chippage

On white 30-inch models, the side panels are direct-on coated Bethnamel. Roper has attained 84 per cent acceptance of these parts on first fire. They have also found it overcomes the disadvantage of heavy overcoats: it practically ends the chippage of finished panels during assembly.

Another benefit of the direct-on process is the elimination of ground-coat costs, both material and labor. Roper ranges have held full whiteness and opacity with the same titania frit used in conventional ground-and-cover processing.

Roper's success with direct-on is built around a sulphuric acid pickle designed to control metal-removal to as close to 2 grams per square foot as possible. This is followed by nickel flash, then neutralization and drying.

Low Carbon Content Solves Boiling and Fishscaling

Bethnamel, developed by Bethlehem research engineers, has a carbon content of about .003, which wipes out the cause of boiling. It draws beautifully, even in severe operations. In two-coat enameling, it is interchangeable with other sheet metals; conversion to direct-on coating involves only simple and inexpensive modifications in the pickling line. Best of all it costs no more than enameling iron. Let us send you a copy of our Technical Folder 734.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

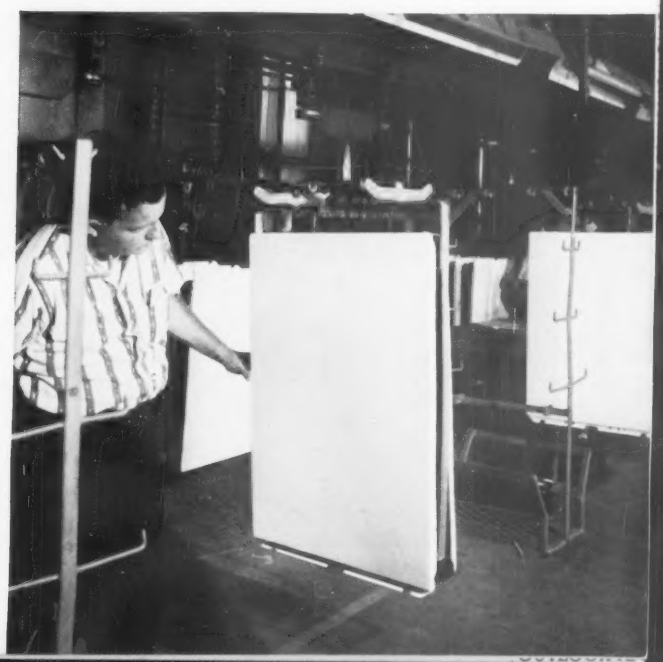
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

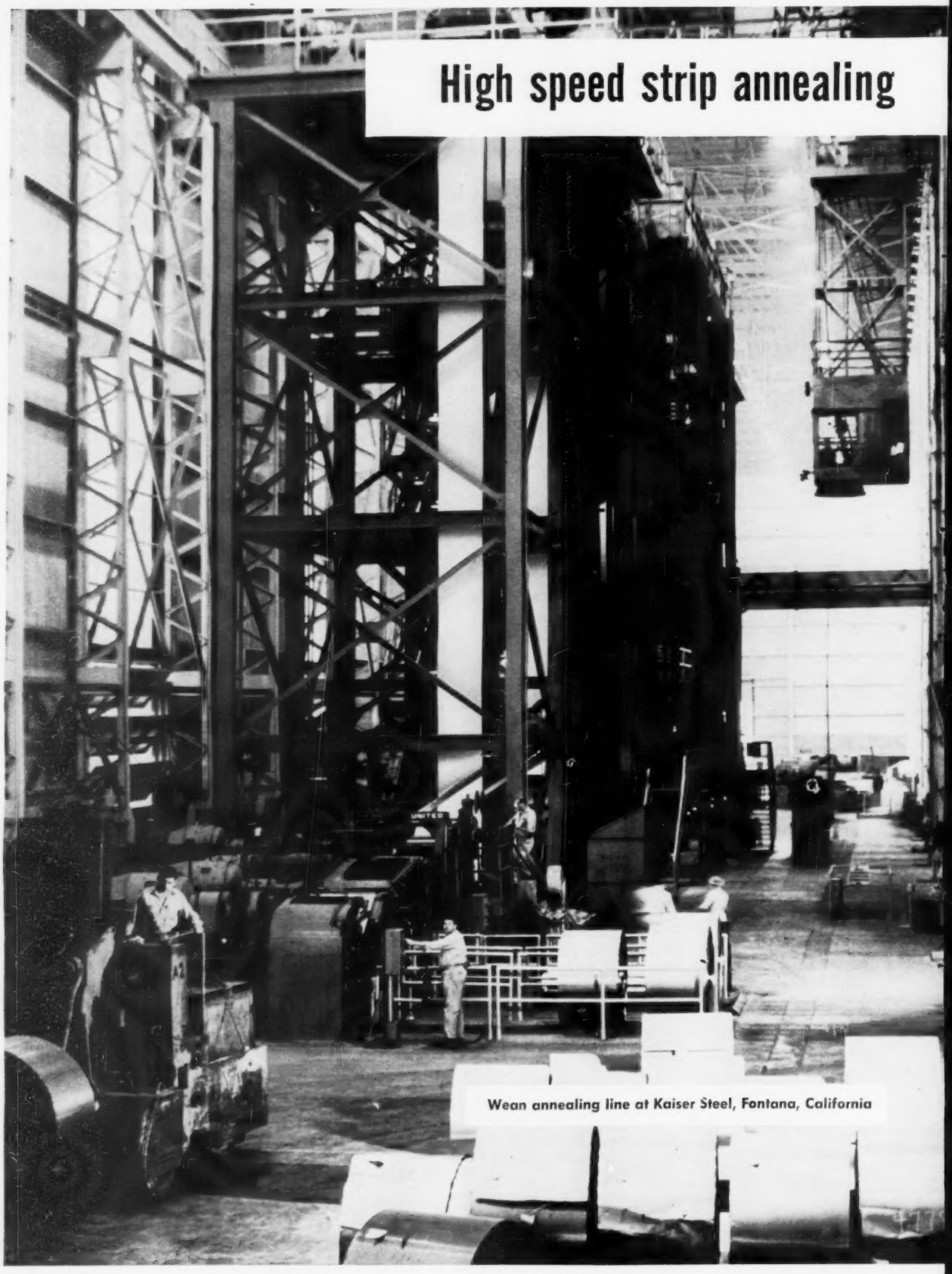
BETHLEHEM STEEL

The same frit as in two-coat enameling is used in this direct-on enamel operation. Parts are then fired at 1490 deg F for 3 minutes, 20 seconds.

Inspection shows excellent adherence and color. Roper inspectors accept 84 per cent of these panels on first fire.



High speed strip annealing



Wean annealing line at Kaiser Steel, Fontana, California

gives steel makers major cost and product benefits

Evolution of process gets major assist from Reliance's creative engineering

Speeds up to 2,000 feet per minute, thinner gauge steel, greater annealing uniformity, and higher tonnage output are the chief reasons for the spread of this process. Actually, lines like this one at Kaiser Steel can handle gauges from .0150″ down to .0070″ in coils up to 90″ outside diameter and widths of 42″ or greater . . . reducing costs in a growing tinplate industry.

Associated electrical equipment must be upgraded to meet the call for higher yield annealing lines. Reliance engineering is presently meeting that challenge. Here are some of the ways:

Furnace tension control

On advanced Reliance systems, the exit bridle is the lead and overall furnace tension is maintained by the entry bridle. Maximum line flexibility is provided, since the entry bridle can be position-controlled or tension-controlled. In tension-control, a regulator monitors the bridle torque, maintaining it at the pre-set level.

For position-control, a torque-regulated furnace tension unit position-controls the entry bridle. The tension unit consists of a short loop provided by a loaded roll, the position of which modifies the speed of the entry bridle. The roll may be locked in position when the bridle is directly controlling strip tension.

Helper drive torque regulation

Since it is economically unfeasible to regulate each of many furnace helper motors, the helpers have been grouped by furnace function (heat section, hold section, slow cool and fast cool). Each group is torque-regulated and each motor held within a group can be adjusted manually to take its share of the load while the entire section automatically holds its relative load position with respect to other sections. Reliance has encouraged the use of this system.

Reliance also strongly recommends the equipment explained below:

Strip-tension measuring load cells

These measure the strip tension existing at the exit end of each furnace section. Associated recording meters enable the operators to relate strip quality and elongation to helper drive torque settings of each section for different conditions of speed, gauge, etc.; in other words, able to study various settings of torque—and be able to repeat those which give the best results.

Automatic furnace tension control

The load cells provide an output signal which *can* be used as an input to the section torque regulators to maintain continuously desired tension. Correct inertia compensation for line speed changes is inherently provided by this system.

Synchro-control of looping tower

This eliminates inaccessible or hard-to-service photo-electric elements. A synchro is used to indicate and regulate tower position.

Automated strip feed-up

This increases the efficiency of entry end material handling, allowing high furnace speeds to be maintained.

It will pay you to discuss with Reliance engineers some of the fine points of annealing line system controls and drives. Creative application engineering, plus the ability to assume total responsibility through start-up and service are the reasons why Reliance is so readily acceptable at engineering, production and management levels of industry. Call your Reliance Sales Engineer. He has an office near you. If you prefer, write for Bulletin L-2513.

L-1672-BW

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Amchem GRANODINE* Phosphate Protection in Depth for Lincoln

Ford Motor Company's luxurious Lincoln Continental and fabulous Thunderbird have established new heights of fine car performance while creating "classic" standards in motor car design.

GRANODINE—The obvious difference in pre-paint treatments

1. Solvent-cleaned—panels failed after 100 hours of accelerated testing.
2. Alkali-cleaned—panels failed after 100 hours of accelerated testing.
3. Granodine-treated—panels excellent after 336 hours of accelerated testing.

Coatings Provide Pre-Paint Continentals and "T-Birds"

Phosphatizing process key to producing rust-proof bodies, long lasting, quality paint finishes

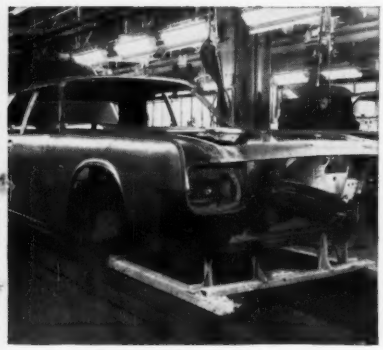
At Ford Motor Company's Lincoln Continental and Thunderbird production plant quality manufacture is the by-word as experienced craftsmen turn out the last word in automotive style and performance.

High among the many quality operations incorporated into these fine cars is the special attention lavished on the pre-paint chemical treatment of bodies and other steel and galvanized automotive parts.

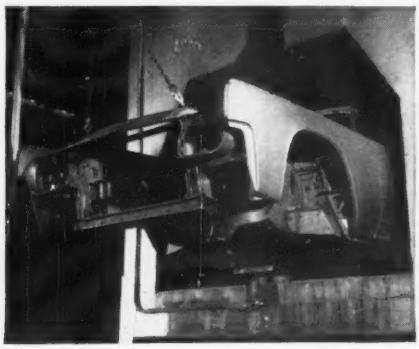
Utilizing the production-proven advantages of Granodine zinc phosphate coatings, this world-renowned automobile producer is providing potential buyers with the ultimate in quality body work, the result of Granodine's greatly improved corrosion resistance and bonding qualities combined with an already highly efficient baked enamel paint system.

Since 1933 Granodine has been demonstrating its dependability in industrial pre-paint operations. Amchem's experience and technical know-how in metal protection techniques assure you that Granodine will meet present day high volume production schedules with minimum maintenance and operator attention. Call your local Amchem Representative for complete details.

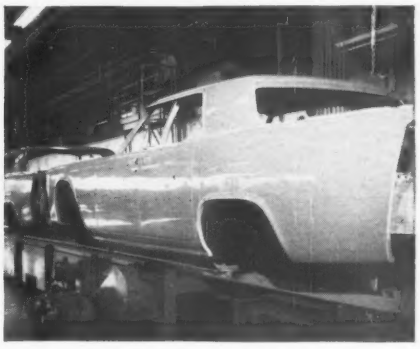
*Amchem's registered trademark for its conversion coating chemical used to produce phosphate coatings on steel.



Body in white in metal finishing area prior to phosphating.



Granodine-treated body at exit end of phosphate washer.



Phosphatized body is seen in final paint line.

AMCHEM **GRANODINE**

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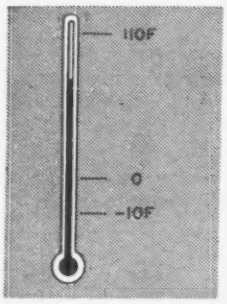
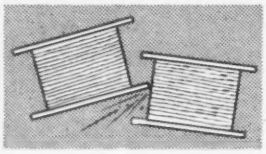
CABLE TALK

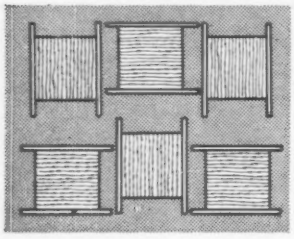
6 tips to help you make the most of your investment in wire and cable

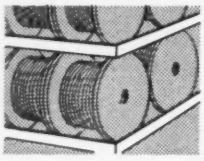


1. Avoid extreme temperatures –below 10F and above 110F (unless cable is specifically designed for this purpose). Low temperatures are seldom harmful to cable, but when they are combined with impact, flexing or other mechanical action, it's possible that the cable may be damaged by cracking, flaking or complete rupture of the coverings. Excessively high temperature, all by itself, can materially shorten the potential service life of stored cable. Thermoplastic components may soften and flow; rubber and many other materials undergo chemical and physical changes at high temperatures. You can avoid this problem by not storing cable near heating units, steam pipes, etc.

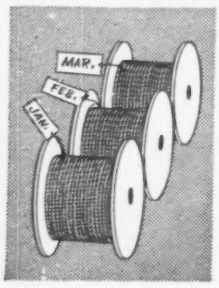


2. Avoid mechanical impact and crushing. Wire on a reel can be rendered useless by allowing the flange of another reel to crash against it. Arranging the stored reels in a crosshatch pattern is the simplest way to avoid this kind of accident. If space is at a premium, the reels may be stored in trays that allow only the flanges of adjacent reels to contact.

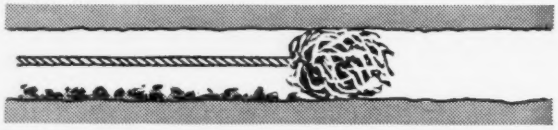




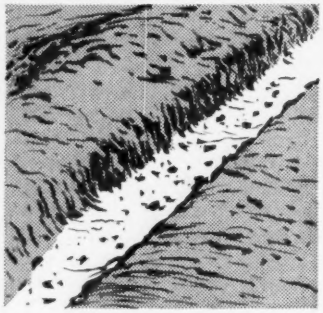
3. Use the oldest stocks first. Very few materials improve with age, so the sooner you use stored cable the longer it will last in service. Also, the less time a cable spends in storage, the less chance there is for damage. Keep rotating stocks so that the newest cable goes to the end of the line.



4. Swab conduit before pulling wire
A remarkable amount of abrasive material–nails, glass and such–can accumulate in conduit, pipe or duct before the wire is pulled through. And pulling a wire or cable through such litter could damage it severely. If you pull a swab through the conduit ahead of the wire to clear the way, you'll eliminate a big source of hidden installation damage.



5. "Direct burial" doesn't mean "on top of anything"
The specification "direct burial" on a cable doesn't mean that you can afford to bury the cable directly on top of whatever you might find in the earth. Trenches should be cleared of rocks and broken glass before the cable is buried. Freezing and thawing can make rocks shift position, and, possibly, exert enough pressure on the cable to cause premature failure. The same danger exists when wires that cross underground rest on each other. Moral: clear trenches before burying cable, bed the cable in sand, and keep crossed cables separated.



6. Pick the strongest component when pulling cable
When wire or cable is being pulled-in, either through conduit or aerially on poles, it's essential to put all the pulling tension on the strongest part of the cable assembly. Ordinary single-conductor material should have pulling tension applied to the bare conductor. Applying tension to the covering materials tends to stretch them, and can lead to breaks in some cases. Always pull preassembled aerial cables by the messenger, not by the insulated conductors. Interlocked-armor cable should never be pulled by the armor, since this may cause severe damage by unlocking the armor.

* * *

This collection of ideas comes from many years of probing into wire and cable problems–and solving them. It's likely that we've come across some problems just like yours, and together we could probably work out a fine solution. So, please give us a call, or write Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York. Department EFL-1-S. 61304U

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FOR TECHNICAL ASSISTANCE ON WIRE AND CABLE PROBLEMS

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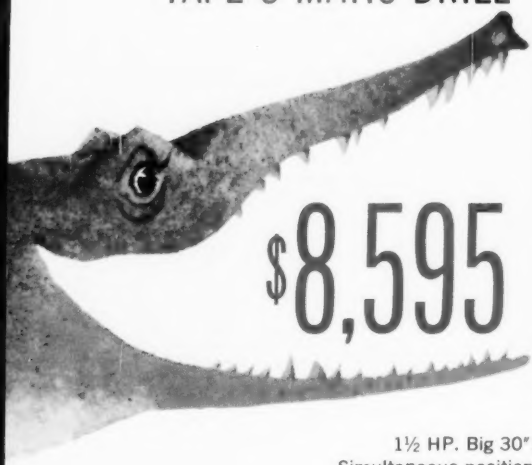

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At last . . . a drill with the finest, transistorized, numerical-control system available for only $8,595 . . . because P&W brings mass production to the machine tool industry for the first time . . . yet maintains the 100-year tradition of P&W quality.

The TAPE-O-MATIC enables **you** to benefit from numerical control . . . to gain a vitally-needed, important competitive edge.

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3 UNIQUE TERMS. You can buy TAPE-O-MATIC using our exclusive Trade-in Plan. You can purchase the drill outright, lease it, or lease it with option to buy. ONE PER CENT CASH DISCOUNT FOR PAYMENT IN 10 DAYS.

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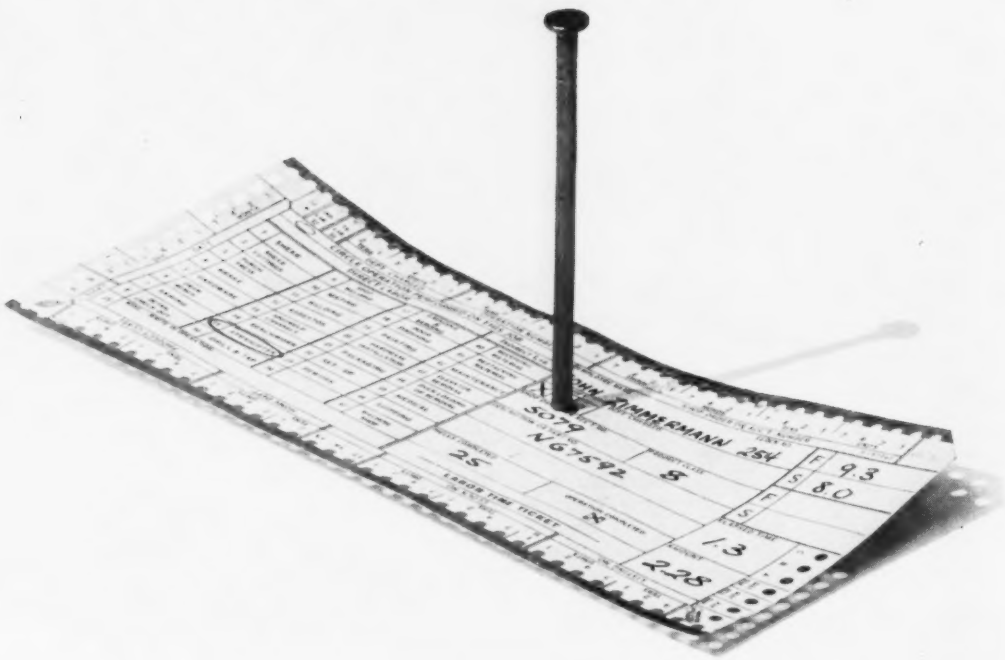

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Use Chlorothene NU in *your* cold degreasing. Contact your distributor of Dow solvents for complete information about its safety features, uses, recovery and cost. Ask him about Dow trichloroethylene, perchloroethylene and methylene chloride, too. Or get in touch with your nearest Dow sales office.

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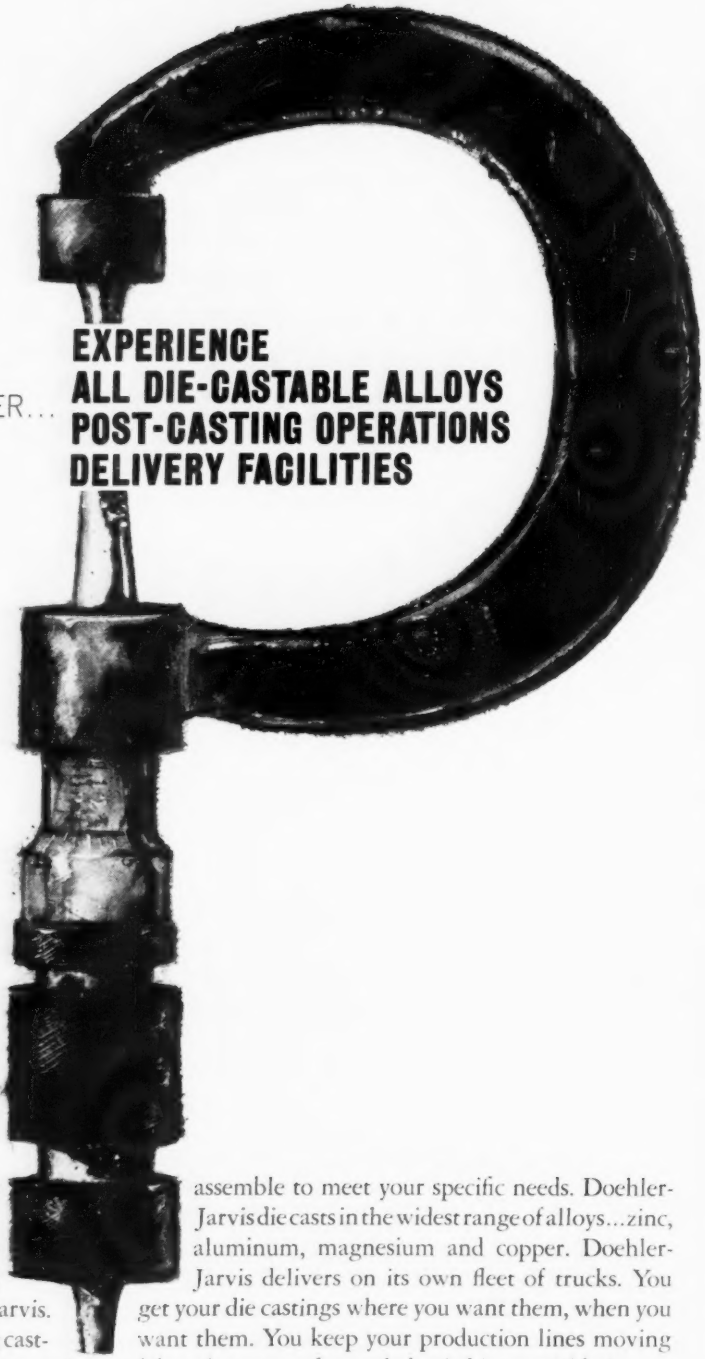

One thing is sure... you don't evaluate your die caster on the price/weight ratio of a single piece of metal, but rather on continuing, accurate and dependable service. That's why we say you get better die casting value from Doehler-Jarvis. Doehler-Jarvis has been producing and finishing castings for over fifty years for all segments of the metalworking industry. Doehler-Jarvis is fully integrated. Designs and makes its own dies... is equipped with casting machines of all sizes and capabilities . . . can trim, machine, finish and subassemble to meet your specific needs. Doehler-Jarvis die casts in the widest range of alloys... zinc, aluminum, magnesium and copper. Doehler-Jarvis delivers on its own fleet of trucks. You get your die castings where you want them, when you want them. You keep your production lines moving and free the money formerly buried in unwieldy inventories. Measure Doehler-Jarvis against any die caster in the business. Then permit us to figure costs when you are in the market for metal parts. Write or call the Doehler-Jarvis office near you.

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MODEL E-2 AUTOMATIC FORM GRINDERS

The Jones & Lamson Model E-2 Automatic Form Grinder is specifically designed for precise, high production, plunge grinding on shaft work up to 31″ in length. It is also adaptable for other types of between-centers work, as well as chucking work and jobs requiring external, shoe-type support.

These Important Features Provide PRECISION FORM GRINDING AT HIGH PRODUCTION RATES

COMPLETELY AUTOMATIC CYCLE . . . High-speed approach, variable wheel feed, spark out, and withdrawal are positively controlled through simple cam action. This ensures a constant and uniform machine cycle.

AUTOMATIC POSITIVE SIZE CONTROL . . . Wheel-slide held against positive stop with uniform hydraulic pressure.

AUTOMATIC TRUING DEVICE with CONTROLLED DRESSING . . . Once per piece, or once per predetermined number of pieces.

CRUSH WHEEL OR DIAMOND TRUING OR PERPETUAL FORM CONTROL (PFC — see center spread)

AUTOMATIC OR MANUAL HANDLING

COMPLETELY PACKAGED HEADSTOCK . . . Equipped with a constant speed A.C. motor. Work speeds range from 50 to 1500 R.P.M. Fast cycling (starting and stopping of the work spindle is done by means of an electric clutch and brake).

ADJUSTABLE WHEEL SPINDLE . . . Fast centerline adjustments for wheels varying from ⅜″ to 2″. Wheel flanges are also adjustable to accommodate wheel widths from ⅜″ to 2″.

DESIGNED FOR EASY MAINTENANCE . . . all hoods and guards are instantly removable. Internal machine components are readily accessible. For instance, the entire wheel-slide transmission can be taken out of the machine by simple removal of seven bolts.

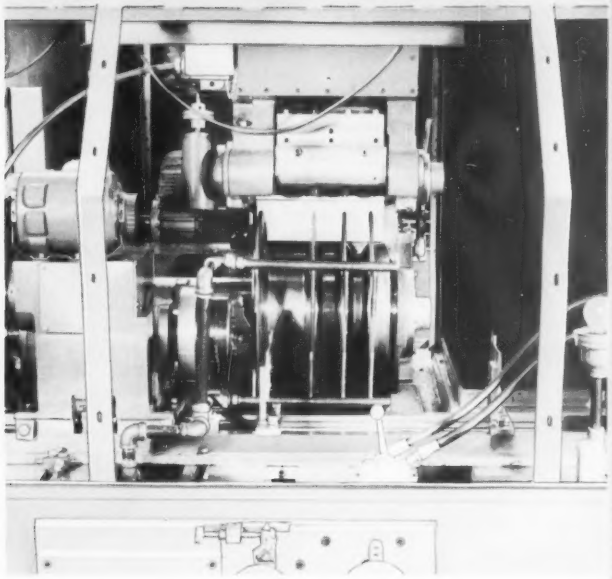
WHEEL-SLIDE HAS HARDENED AND GROUND WAYS . . . with three-point suspension system mounted on straight roller bearings.

EASY TO OPERATE . . . with features such as push-button control for automatic cycling, including automatic counter control for wheel truing.

All controls for operation and set up are located at the front of the machine. Free sliding doors to work area operate on roller bearings. There's plenty of room for loading and unloading—or for automatic handling.

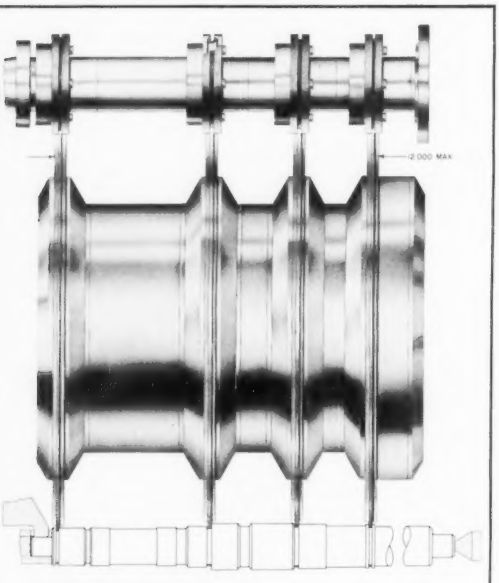
NEW

MODEL E-3 PROVIDES PERPETUAL FORM CONTROL FOR 12" WHEEL SPREAD



This new Model E-3 Form Grinder is specifically designed for precise, high production plunge grinding of widely spaced grooves.

Vertical design of the J & L Perpetual Form Control Truing Device, allows for a full 12" of wheel spread. Grooves up to 12" apart may be plunge-ground in a single pass.



FORM — 4 GROOVES
TIME OUT FOR DRESSING — 0
PRODUCTION — 125 PCS. PER HOUR

SPECIFICATIONS

J & L Model E-2 & E-3 Form Grinders

	MODEL E-2	MODEL E-3
Max. dia. of work ground with 20" dia. wheel	8"	8"
Headstock spindle-speed range	50-1500 R.P.M.	50-1500 R.P.M.
Max. dia. of swing over table	13"	13"
Max. length between centers	31"	31"
Platen — may be swiveled up to	15°	15°
Grinding wheel motor	5 to 25 H.P.	5 to 25 H.P.
Grinding wheel dia. 20" and hole size	10"	10"
Hand infeed per graduation	.0001" on dia.	.0001" on dia.
Max. spread of multiple-spaced grinding wheels	5"	12"

If the J & L Grinding insert is missing, write JONES & LAMSON, 517 Clinton St., Springfield, Vermont, for your copy.

J & L MODEL F AUTOMATIC THREAD GRINDING MACHINE

This machine is automatic in all of its functions. It will grind in both directions, or in one direction with automatic wheel withdrawal and rapid traverse. Pitch changes are accomplished through individual lead screws for each pitch, or hand of thread.

A wide range of work and wheel speeds are available. Work speeds range from 30 to 720 R.P.M. Rheostat control provides an infinite number of grinding wheel speeds between 1000 and 2600 R.P.M. This allows for quick selection of the most efficient speeds for all types of Vitrified and Resinoid Bonded grinding wheels.

Machine accuracy is guaranteed to grind threads within the following tolerances: pitch diameter to within .0005″ in regular production. Thread angle ±5′ on the half angle. Lead ±.0002″ per inch.

SPECIFICATIONS — Model F

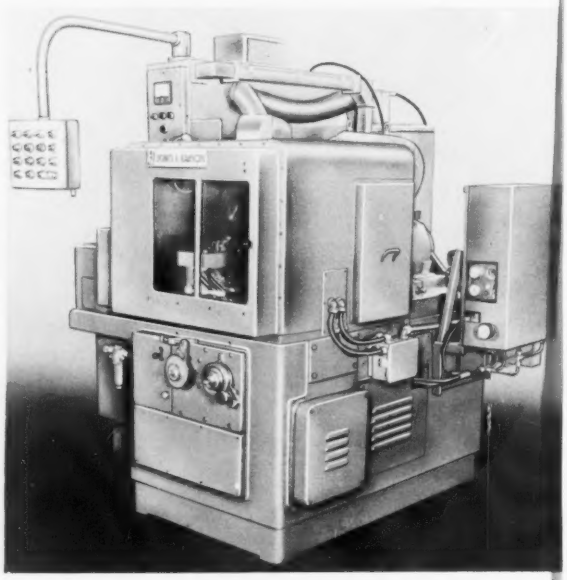
Max. thread dia.	¾″
Max. work length	6.900″
Max. dia. swing over table	10″
Max. thread length	3″
Number of cuts**	1-2-3-4
Standard work speeds*	24 — min. 30 R.P.M., max. 720 R.P.M.

*On special applications, work speeds can be arranged to provide ranges as low as 8.6 to 136 R.P.M. These low speeds will accommodate work with diameters up to 1¼″

**6-8 on two-way grind.

"CRISS-CROSS" GRINDING

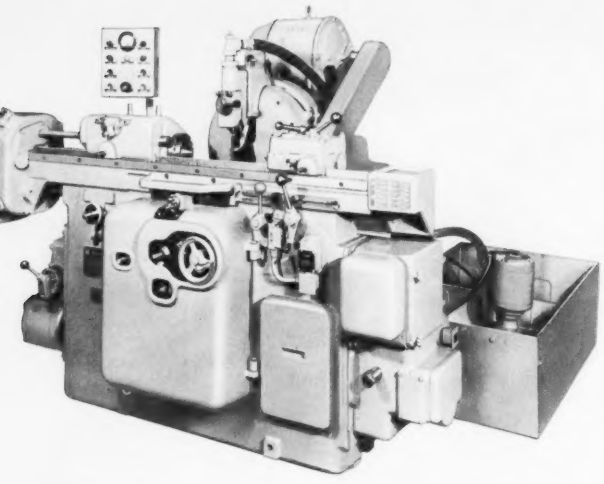
Grinding time can be further reduced by 25%, when two-way grinding with two cuts. Here's how. Two wheel speeds and two work speeds can be provided automatically for each machining cycle. Work may be rough ground at a high wheel speed and a low work speed. Finish passes may then follow automatically with a lower wheel speed and at a work speed double that used for the roughing pass. This feature may also be applied when using one-way grinding.



AUTOMATIC HANDLING On MODEL F AUTOMATIC THREAD GRINDER

Here is automatic handling as applied to the Model F in a tap grinding operation. Magazines for seven different sizes of taps ranging from #6 to ⅜″ are applied to the machine. The tap blanks are then fed to the grinding position, ground, and unloaded — automatically. A warning light, or horn, tells the operator when to change the empty magazine for a full one.

Production of up to 120 pieces per hour is possible.



AUTOMATIC THREAD GRINDERS

6″x15″
6″x36″
12″x45″

6″ x 36″

MODEL TG-615. The 6″ x 15″ Automatic Thread Grinder is used for high-production thread grinding with multi-rib wheels, on relatively small, light work.

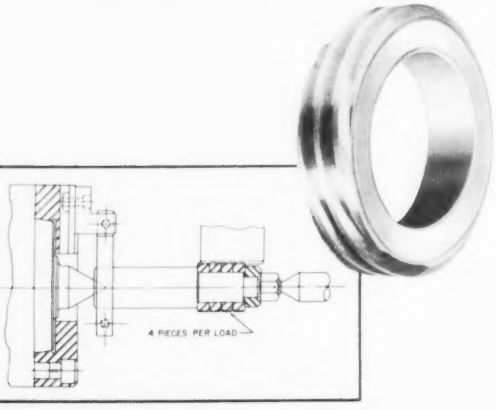
MODELS TG-636 and TG-1245. These machines are extremely versatile and are used on long or short-run jobs on taps, studs, gages, hobs, worms, spindles and a great variety of precision threaded parts. They are also used extensively for various kinds of form grinding. Single-rib, three-rib or multi-rib wheels can be used. They are fully automatic in the work cycle. Automatic dressing of the wheel, automatic sizing, automatic compensation for the amount dressed off the wheel, are some of the features that make these machines the finest of their kind for high precision thread grinding in the tool room or in the production line.

SPECIFICATIONS

	TG-615	TG-636		TG-1245	
	**	*	**	*	**
Max. thread dia.	6″	6½″	6½″	12″	12″
Max. thread length	2″	12″	2″	18″	2″
Max. work diameter	7½″	7½″	7½″	21″	21″
Max. work length	30″	36″	31″	45″	40″
Max. distance from end of thread to headstock center	14¾″	24″	19″	33″	28″

*Single-Rib Wheel.
**Full Multi-rib Wheel.

Any of these machines can be arranged for plunge grinding single or multiple grooves or contours. Multi-ribbed wheels, either diamond or crush dressed, are adaptable for all models.



SPEEDOMETER DRIVE GEARS

These four-start worms are ground, four at a time, in a single pass from the solid. A multi-ribbed wheel is crush-dressed every 48 pieces (twelve arbor loads). The finish on these parts and the rate of production exceed those possible by any other methods.

210 pieces per hour, floor-to-floor

SPECIFICATIONS

Diameter	1.93″
Pitch	Approx. 6
Form	Worm
Thread	4-Start
Lead	.6797″
Helix Angle	6° 37′
Thread Length	1⅞″
Stock removed	.089″

If the J & L Grinding insert is missing, write JONES & LAMSON, 517 Clinton St., Springfield, Vermont, for your copy.

Simultaneous Grinding an

This process is made possible by PFC (perpetual form control) truing devices manufactured by Jones & Lamson and CDP (cemented diamond particle cutters) produced by the Koebel Diamond Tool Company.

It provides continuous automatic control of accuracy for grinding wheels and grinding wheel action.

This revolutionary development permits you to grind many applications that otherwise would not be considered as economically sound for a grinding operation. It also allows one to materially improve upon a wide variety of operations performed by other machining methods or grinding approaches. For instance, automatic handling on grinding jobs becomes a much simpler and more economical process when there is no "time out — for wheel truing".

Depending upon the nature of the job, the wheel truing can be done, either intermittently, or continuously. The frequency of truing is controlled by an electric counter which is set to a predetermined number of pieces. This number is determined by the various specifications and complexities of the operations.

Even when using an intermittent truing cycle, the actual wheel truing occurs simultaneously with the grinding operation. Therefore, whether you are grinding and truing continuously or intermittently — no time is lost for conditioning the wheel.

Life of the CDP cutters is phenomenal. It frequently ranges over several months and hundreds of thousands of pieces ground — without changing the cutters. On one installation the original cutters are still in use after grinding over six million pieces. Also, the versatility of this process permits the best use of either Resinoid or Vitrified bond wheels.

Figures 1, 2 and 3 on the opposite page illustrate typical examples of groove grinding operations employing the PFC plunge form truing device with assemblies comprised of standard and special CDP cutters. Figure 4 shows a thread grinding operation using the PFC multiform truing device. In this case the cutter is controlled by a former as it is traversed across the wheel. Truing may occur simultaneously with the thread grinding operation providing more than one grinding pass is taken.

When equipped with the proper former, the PFC multi-form truing device may also be used for a wide variety of contours for form grinding applications. A single universal design cutter will accommodate a wide scope of threads and forms, or a specialized cutter may be provided for ultimate performance on long-run operations.

The multi-form technique is also adaptable for tolerance and finish requirements which are beyond the range of the plunge form method.

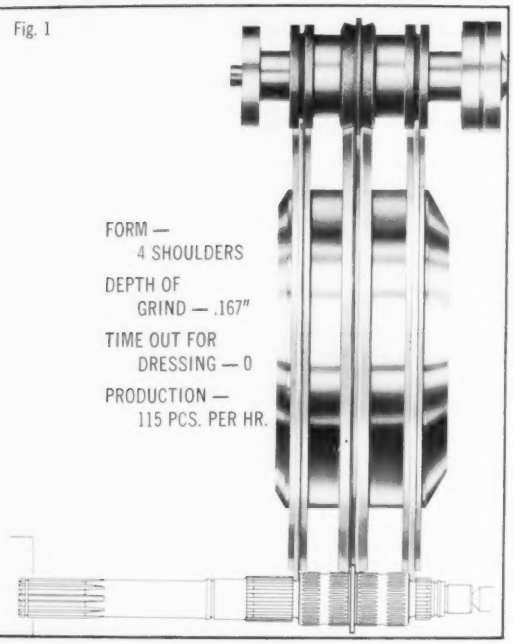
With any of the methods described, the amount trued off the wheel is automatically and accurately compensated for. Therefore, either manually operated or automated machines maintain part size to closer tolerances over a longer period of time than other methods where the dressing tool is more subject to wear. Due to negligible wear on the cutters over long operating periods, substantial savings are also made in inspection costs as only occasional spot checking is required.

Fig. 1

Fig. 3

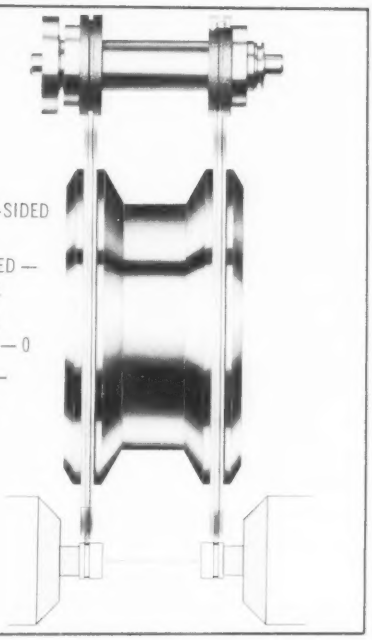
nd Wheel Dressing

Fig. 1



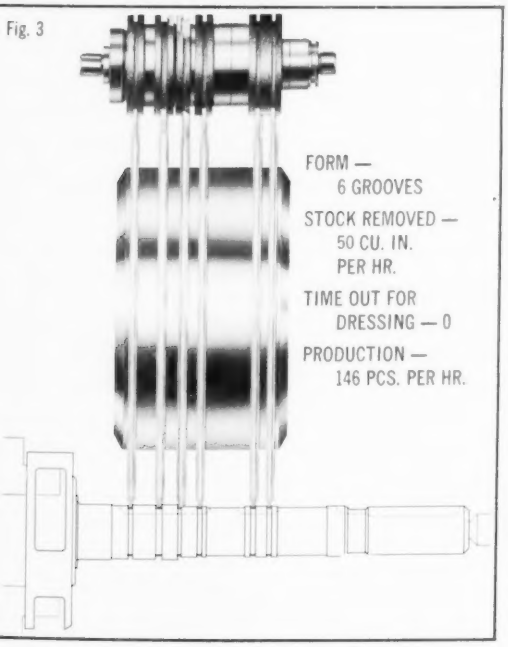
FORM —
4 SHOULDERS
DEPTH OF
GRIND — .167"
TIME OUT FOR
DRESSING — 0
PRODUCTION —
115 PCS. PER HR.

Fig. 2



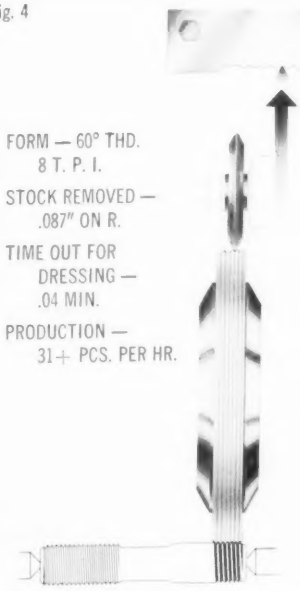
FORM —
STRAIGHT-SIDED
GROOVE
STOCK REMOVED —
.040" ON R.
TIME OUT FOR
DRESSING — 0
PRODUCTION —
2,400 PCS.
PER HR.

Fig. 3



FORM —
6 GROOVES
STOCK REMOVED —
50 CU. IN.
PER HR.
TIME OUT FOR
DRESSING — 0
PRODUCTION —
146 PCS. PER HR.

Fig. 4



FORM — 60° THD.
8 T. P. I.
STOCK REMOVED —
.087" ON R.
TIME OUT FOR
DRESSING —
.04 MIN.
PRODUCTION —
31+ PCS. PER HR.

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NEW

MODEL 410 SEMI-AUTOMATIC THREAD GRINDER

High Precision
Compact Size
Low Priced

The J & L Model 410 is the first completely new thread grinding machine to be developed in many years. Here is a compact size thread grinder, priced accordingly, that provides *full size* capacity and exceptional accuracy.

ACCURACY is within ±5′ on the half angle; size control. 0005″ on pitch diameter; lead error ±.0002″ per inch. Here is how it's done:

High precision is designed for all sliding units using pre-loaded roll design for smooth accurate movements. Lead screw and infeed screw are precision ground. Direct line design of feed screw and stop for accurate size control. Precision work and wheel spindles are cartridge type, pre-loaded and lubricated for life. An inbuilt sine bar provides for long or short lead. A simple, accurate truing device dresses straight sided flanks from 5° to 45° and included angles of 10° to 90°.

COMPACTNESS The 50″ x 54″ floor space includes the machine, electrical panel, coolant tank & pump, plus storage for wheels & tools.

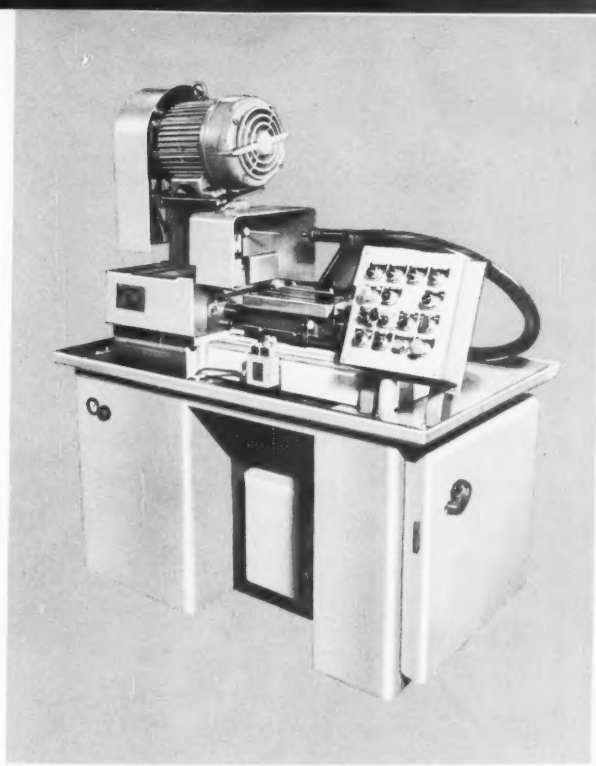
LOW PRICED For approximately $2.00 per hour for a 40 hour week, this machine can be leased on a 5 year J & L Profitivity Lease Plan. Includes: capacity for up to 4″ dia. work with 10″ of full thread length; variable speed work spindle; change gears and lead screw for 5 to 80 pitch threads; automatic truing device; all electric equipment — complete with motor and control panels; dresser infeed attachment; belts and pulleys; tailstock and headstock with centers; wheel adapters and two grinding wheels; plus a set of diamonds and driving dogs. This same machine can be purchased outright for under $11,000.

SPECIFICATIONS

Max. dia. of work	4″
Max. thread length	10″
Max. swing over table	4¾″
Work spindle speeds	2.5 to 120 R.P.M.
Grinding wheel speeds	2700 R.P.M
Max. helix angle	15°
Pitches available with standard set of change gears:	5, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 16, 18, 20, 24, 27, 28, 32, 36, 40, 44, 48, 56, 64, 72 and 80

NEW

PRECISION GUN DRILLING MACHINE FEATURES HIGH PRESSURE COOLANT DISTRIBUTION PLUS SPINDLE SPEEDS OF 15,500 RPM



Here for the first time is a machine which combines the major features necessary for successful gun drilling of very small holes. They are:

1. A *precision high speed spindle* capable of handling high pressure coolant flow.
2. *Accuracy* necessary to control size and straightness as well as excellent finish.
3. *Precise control* of constant, but *infinitely variable feed rates.*

The precision, pre-loaded ball bearing, cartridge-type spindle is specially designed to perform dual functions. It is arranged to handle standard shanks of all gun drills from ½″ dia. down to the smallest (.078″) at speeds up to 15,500 R.P.M. It is equipped with a rotary distributor for handling up to 12 gallons of coolant per minute and pressures up to 2,000 p.s.i. This combination of high speeds and coolant distribution at high pressure is a unique feature of the J & L Precision Gun Drilling Machine.

The machine bed is a rigid diamond-ribbed design, insulated from the base cabinet on a three-point mounting which dampens external vibrations.

The table is air-actuated with rapid traverse and feed controlled by a precision hydraulic check unit.

Performance will vary with material and conditions. However, when working with reasonable material, using proper gun drills in proper alignment, the machine is capable of producing parts to .0005″ in hole straightness up to 6″ in length. It will also hold diameter to .0002″ at a finish of 10 micro inches or better.

Penetration rates of 12″ per minute, or better, are not unusual.

SPECIFICATIONS

Max. length of hole	7½″
Stroke	7¾″ (max.)
Diameter of hole	max. ½″ — min. .078″
Variable or single speed drives for complete range of speeds	3500-15,500 R.P.M. 1750-7350 R.P.M. and 850-3675 R.P.M.
Feed rates	infinite
Floor space — without Coolant System	56″ x 34.5″
Floor Space — with Coolant System	56″ x 83.5″

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NEW MODEL 6 PRECISION BORING MACHINE

High precision . . . Compact size . . . Low priced

This extremely versatile new model is a highly accurate machine for precision boring, turning, and facing operations.

Accuracy is guaranteed to hold .0002″ tolerances on boring and turning operations (these machines are holding tolerances of .00005″ on some operations now being performed in the field).

Precision balance, rigidity, and infinite feed rates provide the basis for maintaining the best possible finish requirements.

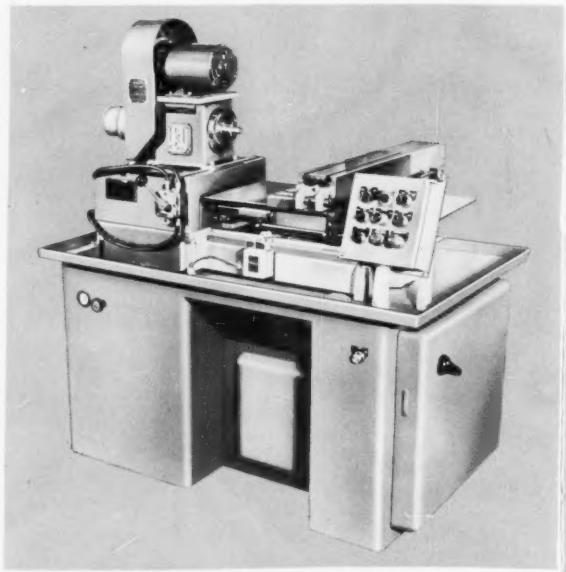
Various machine cycling combinations are available to the operator by merely setting a selector switch. These include: automatic table cycle, automatic table-and-cross-slide cycles, and completely manual operation.

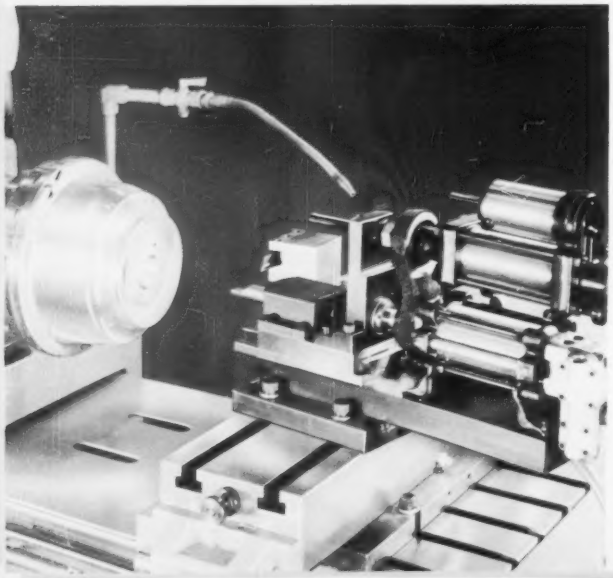
Set-ups are fast and simple All stops and feed adjustments are made from the front of the machine — without wrenches. Operation is even more simple. Just push one button.

Low priced For the wages of a part-time handy man, or about 95¢ an hour (figured at 160 working hours per month for 5 years) you can lease this precision machine with standard tooling arranged to handle most boring, turning and facing jobs with the capability of holding tolerances of .00005″. That's profitable precision for less than $1.00 per hour. Outright purchases make the investment even more attractive.

SPECIFICATIONS

Swing	10″ dia. (max.)
Stroke	7⅝″ (max.)
Bore	3″ dia. (max.)
Speed range	900-3280 R.P.M. or 1500-6000 R.P.M.
Floor space	56″ x 34.5″





Machine V-Belt Groove and Bore Tapered Hole in one operation

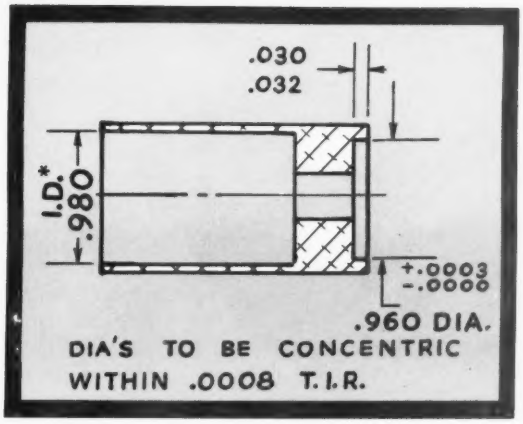
These pulley starter housings are gripped internally on an air operated chuck and located against a drive pin. The automatic cycle is as follows: the table moves to a stop position and the cross-slide feeds in to form a V-shaped groove. The cross-slide then backs out in rapid traverse and an auxiliary air hydraulic feed slide moves in to finish bore the hole on a taper. Feed rate for the grooving operation is .0005″ at 480 R.P.M. The boring operation is to .005″ at 480 R.P.M.

The Job:

Counterbore and hold concentricity on a high production part. Counterbore must be concentric with I.D. within .0008". (Material — aluminum alloy.)

The Solution:

Counterbore two pieces at once on double spindle machine. The table advances both tools to desired depth. The cross-slide then feeds toward the operator to face the bottom of both pieces. The work is held on the I.D.* with air operated collet arbors.

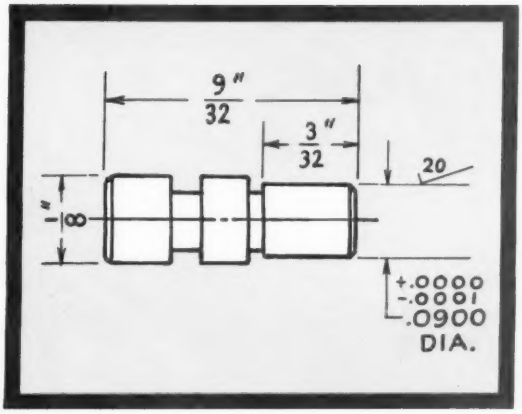


The Job:

Turn and chamfer parts too small for intended centerless grinding. (Material — Stainless SAE 30310.)

The Solution:

Hold in air-operated diaphragm chuck on 1/8" dia, Turn .090" dia. and cut chamfer at end of stroke. A single carbide tool was used on this high production job. The operator had only to load, push the automatic cycle button and unload.

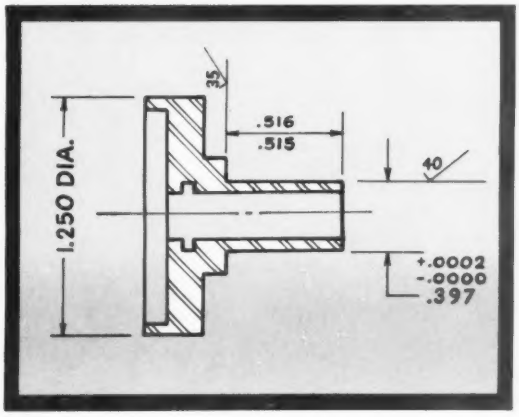


The Job:

Turn .397" dia., face end, and cut "O" ring groove. (Material — 303 stainless steel.)

The Solution:

Hold on 1.250" dia. in air operated chuck for turning and facing. Part is then reversed and held on .397" dia. for cutting "O" ring groove in second operation. Closed cycle feature assures fastest possible cycle as machine is in rapid motion except when cutting groove.



■ *Send financing and leasing information . . . plus . . . catalogs containing complete details on:*

- ☐ 6" x 15", 6" x 36", 12" x 45" Automatic Thread Grinders
- ☐ Model F Automatic Thread Grinders
- ☐ Model E-2 and E-3 Automatic Form Grinders
- ☐ Model 410 Thread Grinder
- ☐ Precision Boring Machine
- ☐ Precision Gun Drilling Machine

Name.....

Title.....

Company.....

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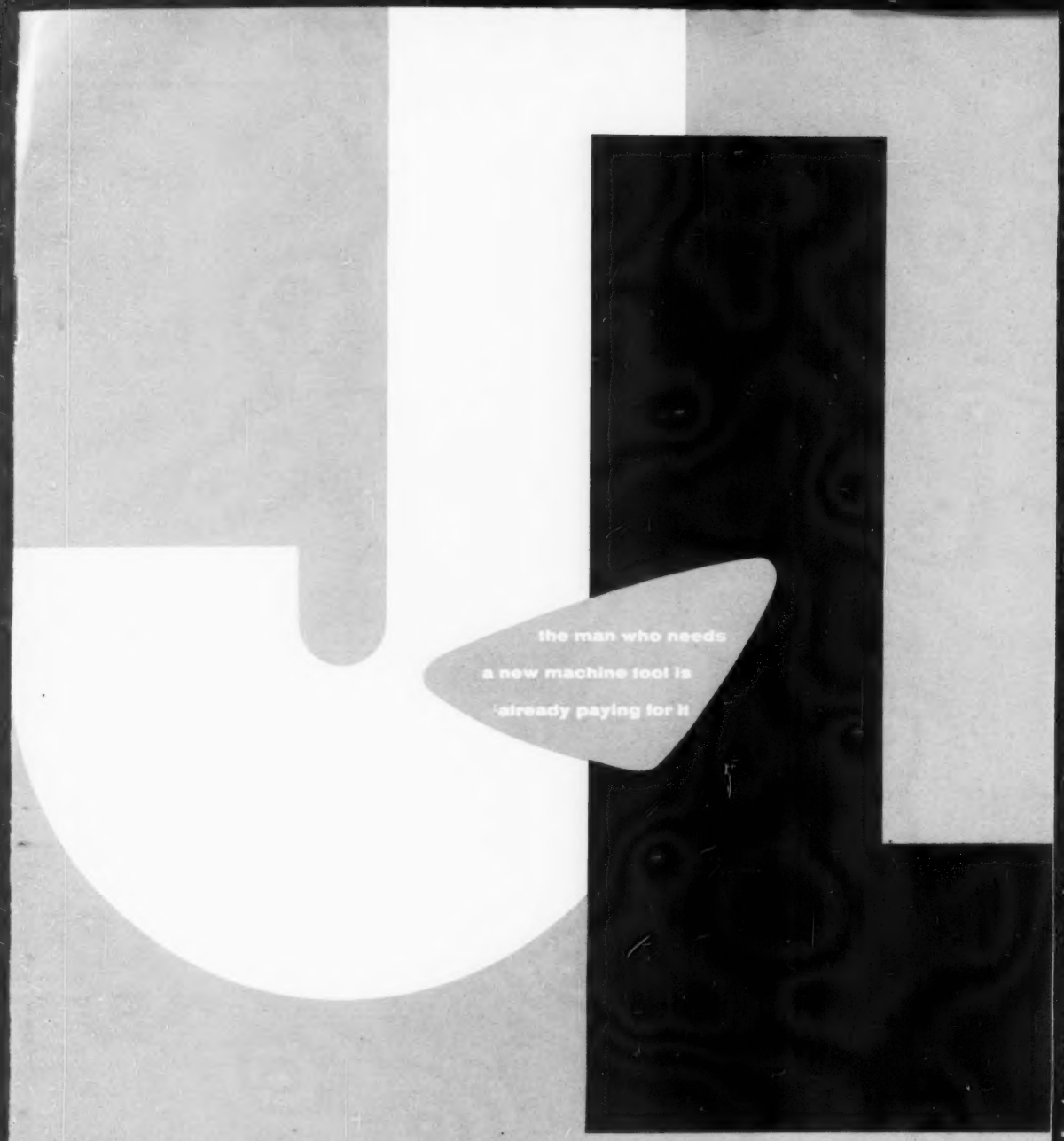

PRECISION

GRINDING · BORING & GUN DRILLING

JONES & LAMSON MACHINE COMPANY

If the J & L Grinding insert is missing, write JONES & LAMSON, 517 Clinton St., Springfield, Vermont, for your copy.

Now you can get
USS "T-1" Steels from
Steel Service Centers
coast to coast

STEEL SERVICE CENTER INSTITUTE

Set-up time: less than a minute with revolutionary new outriggers made of USS "T-1" Steel

It used to take one or more hours to set up the manual outriggers on this "Lorain" Crane. Today it takes about 60 seconds. The reason: "Power-Set" Outriggers built extra-strong with 100,000 psi minimum yield strength USS "T-1" Steel.

These ingenious patented outriggers were developed by Thew Shovel Company, Lorain, Ohio, as standard equipment on all their rubber tire Lorain Moto-Cranes from 25 to 75 tons lifting capacity. They are hydraulically operated and telescope to the chassis width when not in use. As the crane swings into working position, the operator flips four levers and giant, spider-like legs emerge, reach down to firm footing and increase the base and width of operation. Thus stabilized, the crane is ready for a day's work of maximum lifts.

Thew Shovel's Section Chief Engineer, Fred Krueck, says the outriggers couldn't have been designed without USS "T-1" Steel. "The extra weight and mass of structural carbon steel we'd have had to use would have made a major redesign of the carrier necessary. With 'T-1' Steel, we needed only slight modifications to the chassis. 'T-1' Steel also cut handling and shipping costs."

Mr. Krueck also likes "T-1" Steel's ease of fabrication. "It's easy to cut with regular acetylene equipment, usually three pieces to a single pass. There's never a problem with rolling curved sections. And welding is easy."

USS "T-1" Steel and the recently introduced, lower-priced USS "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. All of these tough, weldable USS "T-1" steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributors of USS "T-1" Steels nearest you, write to United States Steel, Room 6423, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks. "Power-Set," "Lorain" and "Moto-Crane" are registered trademarks of Thew Shovel Company.

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Watching Nellie

"See that woman in the blue blouse on the first line?" the foreman asked the new girl. "That's Nellie, our best worker. Watch her today. You'll get the picture of what we're doing in no time."

The British call that the Watch Nellie system. But don't laugh. It's also common in the U. S.—and in more areas than employee training. We're all watching Nellie (playing follow the leader) in a number of different ways.

For years, users of screw machines could buy only solid aluminum bar stock. They often had to machine away the centers, an expensive step. Harvey Aluminum Inc. stopped watching Nellie and developed a tubular product extruded and drawn to size. The move paid off two ways: Orders increased, costs dropped.

Most people think of numerically controlled machines as expensive units turned out in limited numbers. Pratt & Whitney Co. Inc. didn't, and designed a numerically controlled drilling unit. It will be produced in volume and sell for less than $10,000.

Sometimes we can't help watching Nellie. Unions, for example, may force us into a pattern contract settlement. But what sense does it make to apply the same terms to a General Motors and a company employing only 500?

More and more managers are asking that question. A few have been skillful, stubborn, or lucky enough to win significant variations from the norm.

Detroit Tooling Association shops won a settlement below the Big Three auto pattern from the United Auto Workers.

Lone Star Steel Co. negotiated a pact with the United Steelworkers that departs radically from the terms accepted by most other steel companies.

An occasional firm has even wangled a wage cut this year.

Nellie is unquestionably a fine model. But is she the best for us? Let's look around more before we decide.

Now, Sadie and Maude over on line No. 2 look intriguing. Parts of their techniques, plus a touch of our own, may be more our style.

John S. Morgan

ASSOCIATE MANAGING EDITOR

What the flatware story means to you

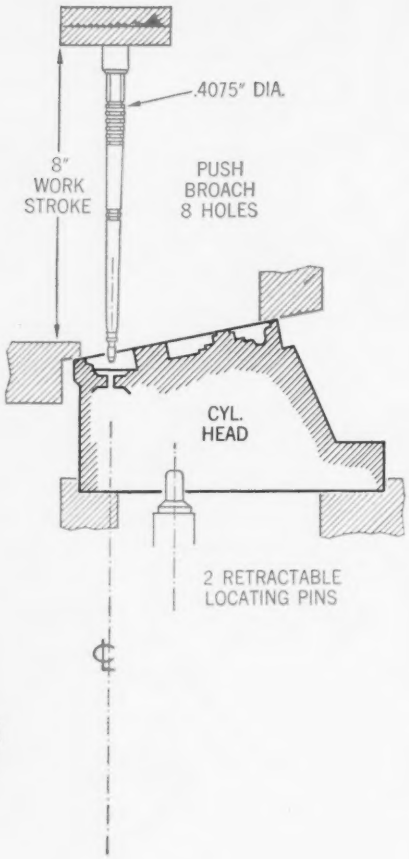
PHOTO BY ROBERT C. HOFFNER

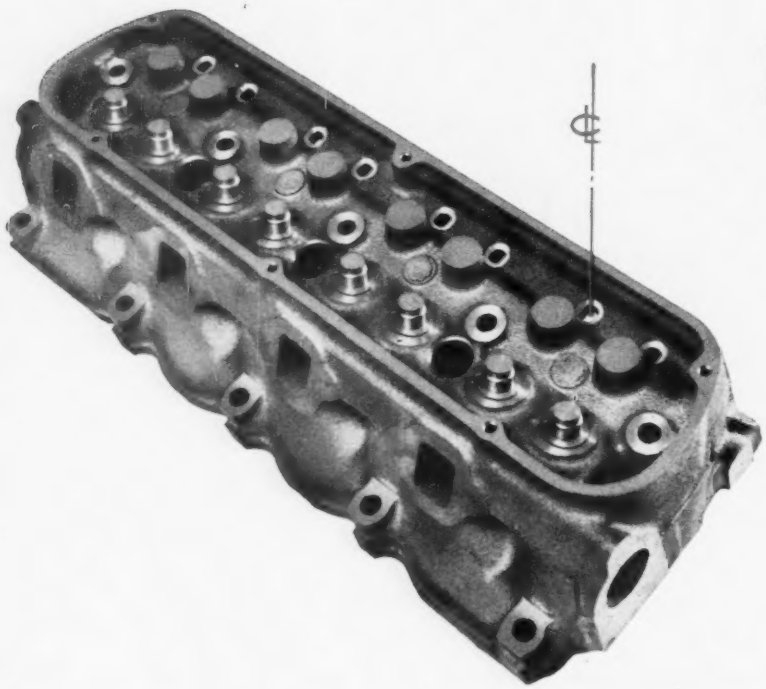
The elegance and exquisite beauty of Stainless Steel is steadily gaining in favor with the manufacturers of flatware. America's leading tableware craftsmen are specifying Sharon Stainless Steels more than ever. They find it easy to work with and like the natural patina it develops with age and use. In fact, they have found it to be the answer to the threat of foreign imports. For lasting durability, with an accent on product beauty, you'll be sure to find other manufacturers of high quality products also thinking Stainless Steels . . . and specifying them from the *Sharon Steel Corporation, Sharon, Pennsylvania.*

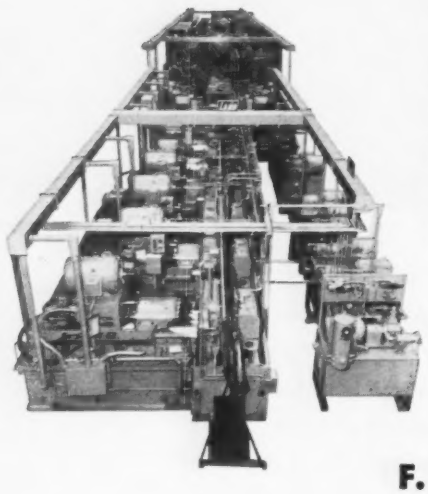
SHARON *Quality* **STEEL** SHARONSTEEL

AMERICA'S FOREMOST PRODUCER OF LIGHT STEELS

LAMB
Sells Methods







V8 cylinder heads—115/hr. @ 100%
80 station transfer line

A standard punch press, adapted to perform broaching operations in an 80-station, in-line transfer machine, is paying off in high production, quality work and long tool life. Eight oblong push rod holes per cylinder head are semi-finish and finish broached in two consecutive stations. Lamb methods minimize an otherwise time consuming operation—handling it well within the 27 second machine cycle with tool change required only after thousands of parts.

1039

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Since 1914 Engineers and Builders of Special Machines and Automation Equipment

New Plant and Equipment Spending

Seasonally Adjusted Annual Rates (Billions of dollars)

	1961 Jan.-Mar.	1961 Apr.-June	1961 July-Sept.	1961 Oct.-Dec.*	1962 Jan.-Mar.*
Manufacturing Industries	13.75	13.50	13.65	14.00	14.55
Durable Goods Industries	6.50	6.20	6.10	6.35	6.70
Primary Iron & Steel	1.35	1.05	1.10	1.10	1.30
Primary Nonferrous Metals	0.30	0.25	0.25	0.25	0.25
Electrical Machinery & Equipment	0.70	0.70	0.70	0.70	0.70
Machinery, Except Electrical	1.15	1.10	1.05	1.10	1.20
Motor Vehicles & Parts	0.70	0.80	0.70	0.75	0.75
Transportation Equipment, Excluding Motor Vehicles	0.40	0.40	0.35	0.40	0.40
Nondurable Goods Industries	7.25	7.30	7.55	7.65	7.85
Food & Beverage	0.95	0.90	1.00	1.00	1.00
Textile	0.50	0.45	0.50	0.55	0.55
Paper	0.75	0.70	0.65	0.65	0.70
Chemical	1.50	1.65	1.65	1.65	1.70
Petroleum & Coal	2.70	2.75	2.85	2.85	2.80
Mining	0.95	1.00	1.00	1.00	1.00
Railroads	0.70	0.70	0.65	0.60	0.70
Transportation, Other than Rail	1.75	1.80	1.90	1.90	1.80
Public Utilities	5.35	5.50	5.65	5.70	5.50
Commercial	11.30	11.05	11.85	12.65	12.90
TOTALS	33.85	33.50	34.70	35.90	36.50

*Estimates.
Source: U. S. Department of Commerce.
Note: Details may not add due to rounding.

Capital Spending Nears Record Pace

LOOK FOR new plant and equipment expenditures to continue increasing into 1962. The first quarter of next year will bow in with a seasonally adjusted annual rate of $36.5 billion—that's only $1.25 billion off the record pace set in the third quarter of 1957, and the highest since that time.

The new figure, reported by the Department of Commerce and the Securities & Exchange Commission, is slightly above the 1960 high (spring quarter), and 6 per cent more than the $34.5 billion estimate of spending in 1961.

The recovery in capital outlays this year has been faster than in any previous postwar recoveries, but the yearend tally will read about 3 per cent below the 1960 figure of $35.7 billion. Nondurable goods industries, communication, and commercial firms expect to spend a little more this year than they did in 1960. Except mining, which is holding even, all other major categories have cut back spending.

All major industry categories, except nonrail transportation and public utilities, indicate their adjusted annual spending rates in the first quarter of next year will top the full-year level in 1961. Also, in the first quarter, the annual rate for durables will show a greater gain (7 per cent) over 1961 than the increase for total manufacturing (6 per cent).

Our Stockpile . . .

U. S. Mulls Possible Shifts

THE OFFICE of Emergency Planning is "actively considering" methods of reducing critical and strategic materials in the nation's $14 billion stockpile. (Translation: Some changes probably will be made.) Those directly responsible for any disposal program must now come up with the ways and means.

The ways and means will be difficult to develop. Most open to reduction is the $8.7 billion worth (cost value) of metals and minerals. Yet, the government is pledged to make no disposals which will disrupt normal market conditions. Foreign relations must also be considered. Last month, the Federation of Malaya protested strongly against the rubber stockpile disposal program, noting that it is "destructive of the stability and economic well-being of the natural rubber producing countries."

Government officials are reluctant to say anything that might be misunderstood on the commodity market, or in foreign countries. However, there appears to be little doubt that over a long period of time (designed to avoid disruption of sensitive market and world conditions) the stockpile will become smaller.

At General Services Administration (GSA), STEEL was told that about half the materials stocked under the three year war requirement exceed our needs. Evaluating just how much is needed depends upon the particular metal or mineral, but several times government officials referred to a need for enough of particular materials to handle a "six month surge" of requirements should another war start.

• **What's Really Excess?** — Our stockpile program is still operating on goals established at the end of 1959, when preparation for a three year war was substituted for five years as a basis for planning. Many observers figure another look is needed now with the development of quick striking missiles with hydrogen bomb warheads. On the other hand, observes a high OEP official, since the Kennedy adminis-

$8 Billion Inventory of Metals, Minerals

(In thousands of dollars as of Sept. 30)

	Cost value
THE BARTER PROGRAM	
(Antimony, asbestos, bauxite, beryllium copper master alloy, bort, cadmium, chrome ore, chromium metal, diamonds, ferrochrome, ferromanganese, fluorspar, iodine, manganese ore, mica, palladium, platinum, quartz crystals, rare earths, rutile, silicon carbonite, titanium sponge, and tungsten carbide powder)	**$ 70,306**
THE NATIONAL STOCKPILE	
(Secret)	**6,098,268**
FEDERAL FACILITIES CORPORATION	
(Tin)	**7,406**
DEFENSE PRODUCTION ACT PROGRAM (excluding machine tools)	
(Aluminum, asbestos, bauxite, beryl, bismuth, chromite, cobalt, columbite, copper, cryolite, fluorspar, graphite, lead, manganese, mica, nickel, palladium, rare earth residue, rutile, tantalite, thorium, titanium, and tungsten)	**1,485,165**
THE SUPPLEMENTAL STOCKPILE (including inventory in transit)	
(Aluminum oxide, antimony, asbestos, bauxite, beryl, beryllium copper master alloy, bismuth, cadmium, chromite, chromium metal, cobalt, colemanite, columbite, copper, diamond, ferrochrome, ferromanganese, fluorspar, graphite, iodine, lead, manganese, mercury, mica, palladium, quartz crystals, rare earths, ruthenium, rutile, selenium, silicon carbide, tantalite, thorium, tin, titanium, tungsten, and zinc)	**1,036,292**

tration has come into office, there has been increased emphasis on preparation for limited war—and not just one limited action at a time, but recognition that the U. S. might have to fight two limited wars simultaneously on opposite sides of the world.

Another factor which must bear on how any disposal program is established: The need to reconstruct the nation's economy after an all-out nuclear war. The President himself early this year pointed out that the U. S. must consider the possibility of taking more than one nuclear attack. This "re-attack" concept comes forward most in terms of the new Civil Defense program, but a stockpile of critical materials for defense industries would have particular value too.

• **Capitol Hill Watchdogs** — Congress is in no mood to allow any dumping of materials. An industry source suggested no major disposal program of any metal or mineral would get by Congress soon because the world commodity markets couldn't stand the strain. Aluminum, lead and zinc, and copper are examples of touchy situations.

In most cases of disposal, express Congressional approval is needed. The Joint Defense Production Committee expects to conduct hearings next year on the stockpile program. Issues the committee will probably review:

1. Should the quantities of materials in the national stockpile remain secret?

2. Why have some proposed small sales been vetoed? (The Interior Department has reportedly stopped sales which some sources feel couldn't harm the market.)

3. Why hasn't the new administration come up with a solid approach to stockpiling which would remove some of the uncertainties and secrecy which now surround it?

4. Why haven't certain affected industries (aluminum, for example) developed their own approach to disposal and helped the government to rid itself of some excesses?

Sen. Harry F. Byrd's (D., Va.) Joint Committee on Reduction of Nonessential Federal Expenditures notes that three materials lead the unclassified stockpile: About 8.5 million tons of aluminum and bauxite at a cost value of $535 million; 5.8 million tons of manganese and ores at $387 million; and 85 million lb of tungsten at $342 million. An OEP source emphasizes that no industry involved should be criticized for the existence of large stockpiles. "It was good insurance at the least," he comments. Of course, U. S. aluminum and titanium industries are good examples of growing industries which were helped by the Defense Production Act at a time when they were desperately needed. (They put excess production to the government stockpile at prices which enabled them to grow.)

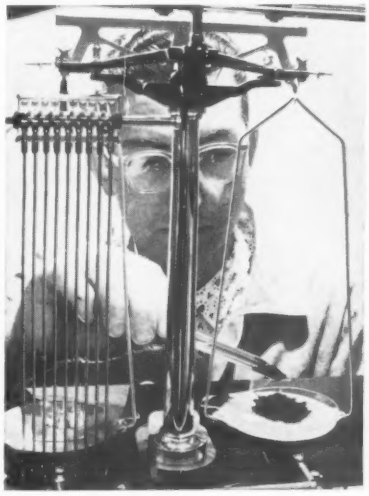
• **The Cats and Dogs**—OEP and GSA officials generally refer to current disposal programs as "getting rid of the cats and dogs." In the early days of the stockpile, materials were bought or bartered for as fast as possible to build stocks. When Space Age thinking began to jell in 1956, many materials automatically became surplus. Today, OEP is working with the Joint Chiefs of Staff to ascertain new requirements, but the job isn't easy.

One new element of planning in the Space Age: Production sites have become vulnerable to enemy missiles. Therefore, if production is limited to only one or two areas in the country, shouldn't a relatively larger quantity of the material be stocked, than if the same amount of capacity were spread about the country?

Another reason for keeping the stockpile flexible, say government officials: Material needs change or technology outdates materials stockpiled. There is no longer a requirement for stocking titanium, but tellurium and beryllium have achieved new status.

• **A New Program?**—Some stockpile authorities would like to see a "relaxation" of Congressional control to better achieve flexibility in the program. Chances are that the administration, through the National Security Council, will endorse some sort of a new look—taking into account the sensitiveness of the situation. The rotation program set up in 1959 "broke the ice," notes one source, so Congress may be willing to allow GSA more leeway, at least with what a source calls the $400 million worth of subspecification material. After that, the managers are concerned about $3.5 billion in strategic materials they consider excess to our needs.

The barter program remains tough to handle. As it stands, we would have to dispose of $300 million worth of materials a year just to compensate for what comes in as exchange for surplus agricultural commodities. An OEP source suggests the barter program is realistic if you remember that minerals and metals are much easier to store than wheat.



Easy there! Twice as heavy as lead, more costly than gold, powdered rhenium added to tungsten forms a . . .

New Alloy for Flashbulbs

RHENIUM, a rare metal byproduct of copper mining, is being used to improve dramatically the qualities of tungsten wire. The work is being done by General Electric Co.'s Lamp Metals & Components Dept., Cleveland. An exact amount of powdered rhenium (3 per cent) is mixed mechanically with powdered tungsten, sintered into ingots, and drawn into 0.4 to 60 mil wire.

Increased electrical resistance of the tungsten-rhenium alloy makes it especially useful in flashbulbs.

Other qualities of the new alloy: Improved pliability and elongation, greater tensile strength, and better resistance to oxidation.

"The things we didn't do were important too"

Richard Allchin (left), president of Rotor Tool Co., and Eugene L. Miller, president of Cooper-Bessemer Corp., in Rotor Tool's Cleveland plant

They Planned a Painless Merger

"2 PLUS 2 EQUALS 6!"

That calculation wouldn't satisfy a schoolteacher. But it is the way Eugene L. Miller, president of Cooper-Bessemer Corp., Mt. Vernon, Ohio, describes the merger that made Cleveland's Rotor Tool Co. a part of the Cooper-Bessemer industrial complex two years ago.

Mr. Miller's unorthodox arithmetic is simply a way of expressing a successful merger: The strength of the consolidated organization is greater than the sum of the premerger strengths of the companies involved.

Cooper-Bessemer, a maker of heavy duty engines, air compressors, gas turbines, and control systems, has annual sales in the $60 million range. Rotor Tool, a manufacturer of industrial air power tools, had an annual sales rate of about $5 million at the time of the consolidation in 1959.

The merger, which culminated a five year search, was part of Cooper-Bessemer's long range expansion program. The move was made to even out the ups and downs in the company's sales of heavy equipment, broaden its line with complementary products, open doors for sales of its new industrial compressors, and improve the company's earnings potential.

"Rotor Tool has fulfilled those goals to the extent we planned," says Mr. Miller.

Cooper-Bessemer's expansion program is actually based on a "plan." Acquisitions "must not be haphazard," warns Mr. Miller. "A company must be willing to assign key staff members to the important task of planning and investigating purchases. It is not something that can be handled out of the hip pocket or done in 15 minutes on Monday morning! There are too many 'casual,' poorly executed mergers." Cooper-Bessemer has three or four top executives working on acquisitions at all times.

Richard Allchin, president of the Cleveland subsidiary, gives further insight: "The reason for the success of our merger is to be found in the things Cooper-Bessemer did and, most important, did not do after it assumed control. The result was a productive relationship achieved without the turmoil and personal unhappiness that sometimes crop up when a larger company buys a smaller one."

Underlying the attitude of Cooper-Bessemer toward Rotor Tool is Mr. Miller's philosophy: "You can kill a small organization if you're not careful. Here was a company possessing all the things we were looking for in a subsidiary. We felt it could fulfill the goals we had in mind, so we made no changes." Mr.

What did these two companies look for in a merger partner?

ROTOR TOOL CO.:

- An established company with a good reputation and a solid line of compatible products. Sufficient resources to aid in developing Rotor Tool's potential.
- A firm with a listed stock to give in exchange. Reason: A proprietor of a closely held company should recognize the danger to his estate if his assets are not easily and quickly convertible at his death.
- A company that would allow Rotor Tool to continue to operate autonomously and would not disrupt the work force; also one that would let Rotor Tool retain its identity and not move its plant.

COOPER-BESSEMER CORP.:

- Are products compatible? Will the subsidiary enhance over-all operations?
- Is it a well managed company? Does it have a good operating record with a number of distinct strengths?
- Will it improve Cooper-Bessemer's earning power?

Miller recalls that he didn't even put a foot inside the new plant until three months after the papers were signed!

Mr. Allchin points out that Cooper-Bessemer could have made several moves legitimately, but chose not to. It could have:

- Submerged Rotor Tool by eliminating the firm's name and trademarks.
- Made Rotor Tool follow policies and procedures that work well in a larger company but might not in a smaller one.
- Diverted Rotor Tool's earnings to the exclusive benefit of Cooper-Bessemer.
- Put Cooper-Bessemer managers on Rotor Tool's staff, been arbitrary in running the business, and pirated people at Rotor Tool for service with the new parent.
- Treated Rotor Tool as a job shop and pushed through orders for equipment and repairwork to the detriment of its production schedules.
- Established direct liaison between functions, such as engineering, sales, or purchasing, with resulting confusion about what's going on.

Here's a rundown on results of Cooper-Bessemer's hands-off policy:

- **Identity Kept.** The reputation built by Rotor Tool over the last 34 years remains a valuable asset. Customers continue to trust the name and retain their confidence in Rotor Tool products and services. One of the old timers at Rotor Tool puts it this way: "We spent many years building up the company as a symbol of quality and service in portable air tools. Few of our customers know that we're part of Cooper-Bessemer now, and what's more, they don't care. If we tried to make a change in our trademark or our product tradenames, customers of long standing would suffer."

Though salesmen of the two companies work separately, they bird dog for each other. One of the fruits of the merger has been the opportunity to provide systems engineering. (In this case, the installation of a complete air power system—compressors through tools.)

- **No Crippling Insecurity.** The morale of Rotor Tool's management is as good as it ever was—meaning it's still excellent. Not one man was let go as a result of the merger, even though selective or even wholesale firings frequently occur when a small company is gobbled up by a larger one. The situation at Rotor Tool is a tribute to the strength of its management—and it illustrates a key plank in Cooper-Bessemer's acquisition plan: "We aren't interested in firms that are in bad shape," President Miller states. "We want a prosperous, expanding company that can be fitted into our growth plan, not a tax loss. And we want that successful management team to continue to function as it has been doing."

One of the chief dangers of this type merger is the disruption of employee routines and a feeling of identity loss. Both hurt morale. Rotor Tool's industrial relations program was continued without change, and so were long established employee policies. Promotions are still initiated by Rotor Tool, and retired executives are retained as consultants.

- **No Communications Woes.** Communications between the two organi-

zations are handled exclusively by Mr. Miller and Mr. Allchin. At first, though, there was direct contact between Cooper-Bessemer executives and their counterparts at Rotor Tool, but the arrangement didn't work too well. Now, with all information and requests channeled through the two presidents, lines of authority are clearly drawn. This single link does place a heavy burden on the chief executives of the two firms, but it bypasses many communications problems.

• **Added Support.** Having the backing of the bigger company allows Rotor Tool to do research and new product development to an extent never before possible. The full resources—money, staff, and facilities—of Cooper-Bessemer are available at all times.

As a result of such support, Mr. Allchin expects Rotor Tool sales to increase about 20 per cent in 1962 over 1961's.

• **No Job Shop.** Rotor Tool does do work for Cooper-Bessemer, but on the same basis as it does for any other customer. An added advantage: The occasional slack period can be filled in with repairwork for Cooper-Bessemer.

The late Herbert P. Bailey, founder and former chairman of Rotor Tool, once summed up what he believed to be the basic reasons for the success of the merger: "It was a matter of integrity and of the breadth of experience of the men involved. These qualities allowed the two companies to retain their corporate identities and make their union as unobtrusive and compatible as possible."

Japan's Car Exports Lag

FAILURE of Americans to buy Japanese cars is a major factor in that country's inability to meet its 1961 export goals, says the Japanese Motor Industry Association. It reports that 15,753 vehicles worth $28.7 million were exported in the fiscal half year, April through September. Although that's a 54 per cent hike over last year's period, it's less than half of the annual target of 36,000 units. Only 4515 cars were shipped out in this six month term against an annual schedule of 14,400 units.

Factors Behind Shifts in Organizational Framework

Behind the flat facts of corporation expansions, mergers, and acquisitions is a story of changing ideas about how a company should (in fact, must) be run if it is to succeed. A current survey by the National Industrial Conference Board reveals the management concepts taking hold in the country's biggest firms. Today's new approaches stem from the complexity that goes with bigness, demands on company officials that did not exist in years gone by, and new needs produced by shifting legal and economic conditions.

Divisionalization Accompanies Decentralization

The report suggests the need for reconsidering traditional, functional organization. With problems of competition, technology, and marketing intensified by going into new fields, many firms find they can cope best with the resulting situations by grouping functions on a product basis and delegating responsibility for them to the heads of product divisions. Result: Individual product lines get more emphasis, it's easier to pin down profitability, flexibility in operations is increased, and it's possible to compete more effectively in a variety of markets.

Such an approach even applies to steel and other companies whose production processes have historically lent themselves to functional organization.

Role of Corporate Staff Is Expanding

Staff members are now increasingly welcome in the executive suite and get hearings. Examples: Specialists in community relations, stockholder relations, computer technology, research, organization development, marketing, and long range planning play increasingly important roles in corporation councils. The NICB says that is due to the competitive situation, or greater emphasis on divisional structure. No longer is the staff just a service.

Group Executive Comes into Being

As product line supplants functional organization, the problem of co-ordinating the separate divisions is more difficult. A common solution: An executive vice president to ease the president's load. But some firms find that even that device isn't enough, so intermediary or group executives responsible for two or more divisions are appointed. That is usually attributed to a company's desire to cut the chief executive's span of control and is required by increasing demands on the chief's time and more interaction among divisions.

'Office of the President' Gains Status

Chief executives are getting more direct help in running operations thanks to faster, better information from staff people and delegation of authority to personal assistants. "Office of the president," comprised of top executives who co-ordinate operating and staff units, is appearing in many companies. Although responsibility still rests on the boss's shoulders alone, his function is becoming more decentralized too.

The Trader's Horn

by S. J. Rundt

Labor Problems in German Machinery

GERMAN MACHINERY production in the first half was valued at $3.29 billion, an increase of 18.9 per cent over the first six months of last year and 5.2 per cent above the July-December total. Machinery exports from Germany were up by 23.5 per cent and 7.1 per cent, respectively, to $1.33 billion. That the inflow of new orders has declined since mid-1961 is of less concern to German machine builders than are union demands for higher wages, a cut of the workweek (from 44 to 42.5 hours), and an increase in annual paid holidays from 12 to 18 working days, all of which combined may spell a rise in production costs by as much as 20 per cent.

Bullish on Japan

TOKYO'S GOLD and foreign exchange reserves may well drop to $1.2 billion or even below, as Nippon is suffering from external payments troubles; its home economy is more overheated than any other today. But U. S. and European banking and industrial circles remain optimistic. Japan has the discipline and the means to stave off protracted ill consequences of its current superboom. Shippers of U. S. machinery should, however, note that the machinery import quota for the second half of fiscal 1961-62 (ending next Mar. 31) has been reduced by $100 million, to $350 million.

Export Guarantees: How Much Help?

THE EXPANSION of this country's official insurance coverage of foreign sales is to be finally unveiled in January—or February or later. One foreign observer, after a few drinks, said that the American would-be insurers, public and private, "behave somewhat like unwilling virgins in a house of ill repute." Yet if U. S. exporters were to be afforded the same liberal and flexible facilities traditionally available to their confreres and competitors in such nations as Germany, France, and Belgium (not merely on the books, but in practice), this would, indeed, be a more positive step toward an acceleration of American export earnings, than all the talk, the propaganda, the pleas at GATT, the New Frontiers of our international trade policy, the foreign aid outlays financing some of our exports, and the subsidies so far in the headlines. The expansion of our export level is still the most potent prescription for our balance of payments malady (alongside more sensible taxation for income of overseas operations and some prudent pruning of our foreign spending from the public till).

Two Useful Publications

A COMPLETE BOOK (*Eurotariff*) covers all current Common Market duty rates, internal and external, country by country, plus the target tariff of the EEC. A prompt updating service is available via 12-month subscriptions. Cost: $200 per year. U. S. distributor: Thos. Ashwell & Co. Inc., 20 Vesey St., New York 7, N. Y. *Foreign Tax and Trade Briefs* covers tax laws in 86 countries, is brought up to date every two months. Cost: $60 per year. Distributor: Matthew Bender & Co., 205 E. 42nd St., New York 17, N. Y.

U. S. Failures in Switzerland

AN ON-THE-SPOT SURVEY by this writer in Zurich, Basel, Lausanne, Geneva, and elsewhere has reconfirmed what was indicated in this column (STEEL, Nov. 13, p. 121): More than one U. S. concern has picked the wrong location, has poorly chosen transplanted U. S. personnel, and has usually forgotten to establish intimate relationships with the powerful Swiss banks. Quite a few companies from these shores started out with the least effective contacts, relied too much on attorneys, set up weak boards, or failed to integrate in the host country. To lift a foreign corporation deftly into the right position in Switzerland has become more than a routine operation. It requires much tact, finesse, local knowhow, and the right connections.

The U. S. National Debt

OUR NATION'S indebtedness, somewhat unheralded by the press, last month bumped close to its statutory ceiling of $298 billion! Monetary erosion can never be turned into a constructive instrument. And once inflation has been accepted as a medium to stir growth, the avalanche is not easily controlled. "A little bit of inflation" is as difficult to attain and to contain as a little bit of pregnancy. Moreover, to internationalize inflation, in economic terms, equals the scourges of war, in political ones.

What Goals in Unemployment Study?

Senator Proxmire Chairs the Study Committee

Representative Curtis Sees Some Politics Involved

CONCERN THAT unemployment will remain high well into 1962 is leading Congress to examine some of the basic problems of measuring and interpreting the significance of unemployment. The Economic Statistics Subcommittee of the Joint Economic Committee is doing the job. Hearings start today (Dec. 18).

Sen. William Proxmire (D., Wis.), subcommittee chairman, pointed out last week: "In the four years since November, 1957, the unemployment rate has remained about 5 per cent or more, with the rate 6 per cent or higher in 25 months out of 48." He now asks:

1. Are our statistics adequate in terms of concept, coverage, consistency, accuracy, and amount of detail?
2. Has the unemployment rate resulted from structural changes in the economy which make it difficult to reduce unemployment?
3. What are the implications of the first two questions to public policy?

Witnesses before the committee will range from people in the Bureau of Labor Statistics to the National Association of Manufacturers and the AFL-CIO. Observers are asking: Is this a serious study of the problem of identifying the unemployed or another Washington tack into the political winds?

One Republican on the subcommittee, Rep. Thomas B. Curtis (Mo.), has some reservations about the study, sensing a political bias in the manner in which Senator Proxmire is handling the hearing. (More than one congressman expressed surprise in recent weeks over the usually straightforward Joint Economic Committee turning its forum into another arena for the exhibition of political talents.)

Congressman Curtis reports we have the best employment and unemployment statistics (in terms of accuracy) in the world; yet, this is no reason for not examining them for possible shortcomings. The young Republican asks: 1. Just how many persons are unemployable for medical reasons and should they be included in government unemployment statistics? 2. Isn't it wrong to call a student attempting to upgrade himself by further schooling unemployed when he leaves his job voluntarily? 3. Are we accurately counting the persons who are temporarily between jobs on a voluntary basis?

Representative Curtis thinks an answer to the question, "Who are the unemployed?" will have tremendous effects on the course of the nation's economic policy. The President's Council of Economic Advisers, he says, bases much of its thinking about the necessity for increased public spending on the assumption that much of today's unemployment is structural—persons out of jobs because the economy isn't operating as it should. The congressman suggests much unemployment today results from a "dynamic economy" which makes many workers obsolescent, in the sense that they lack the skills to hold jobs. He would emphasize retraining our unemployed for new positions; he says the White House sees the solution to unemployment in more government spending to artificially produce jobs.

● **TRADE LINE WEAKENING**—The appearance of Under Secretary of State George Ball before Congress last week marked the first step in a retreat by the administration from its all-out attempt to push a vastly changed trade program through the fast-closing protectionist ranks. Denying that the Kennedy program has been finalized, Mr. Ball said some of it might be revealed in the President's State of the Union message in January. He hinted that Congress would not see the full program until later in the session. If usually acute Washington observers read Mr. Ball's position correctly, then the administration's horn tooting for free trade has been designed to flush out protectionist sentiment, the better to counteract it with specific tactics.

...fast, automatic 1¼" strapping of strip steel coils with the new M30

Coils come down the line from the slitter into this big, rugged Signode M30. At the push of a button, inch-and-a-quarter strapping is applied through the eye in seconds—tensioned, sealed, and cut-off. The seal is on the *inside* of the coil. Another control rotates the coil for the next strap. Any number of straps can be applied. Finally, the machine ejects the strapped coil. The M30 handles coils up to 72 inches outside diameter, from 4 inches to 24 inches in width.

M30's are at work now in mills. A 20-minute color motion picture is ready, so you can see one on the job. Signode steel mill specialists will be glad to consult with you to establish the savings you may expect, and to work with your men in planning an efficient installation. Let us send you more information, or arrange a discussion session including the M30 movie.

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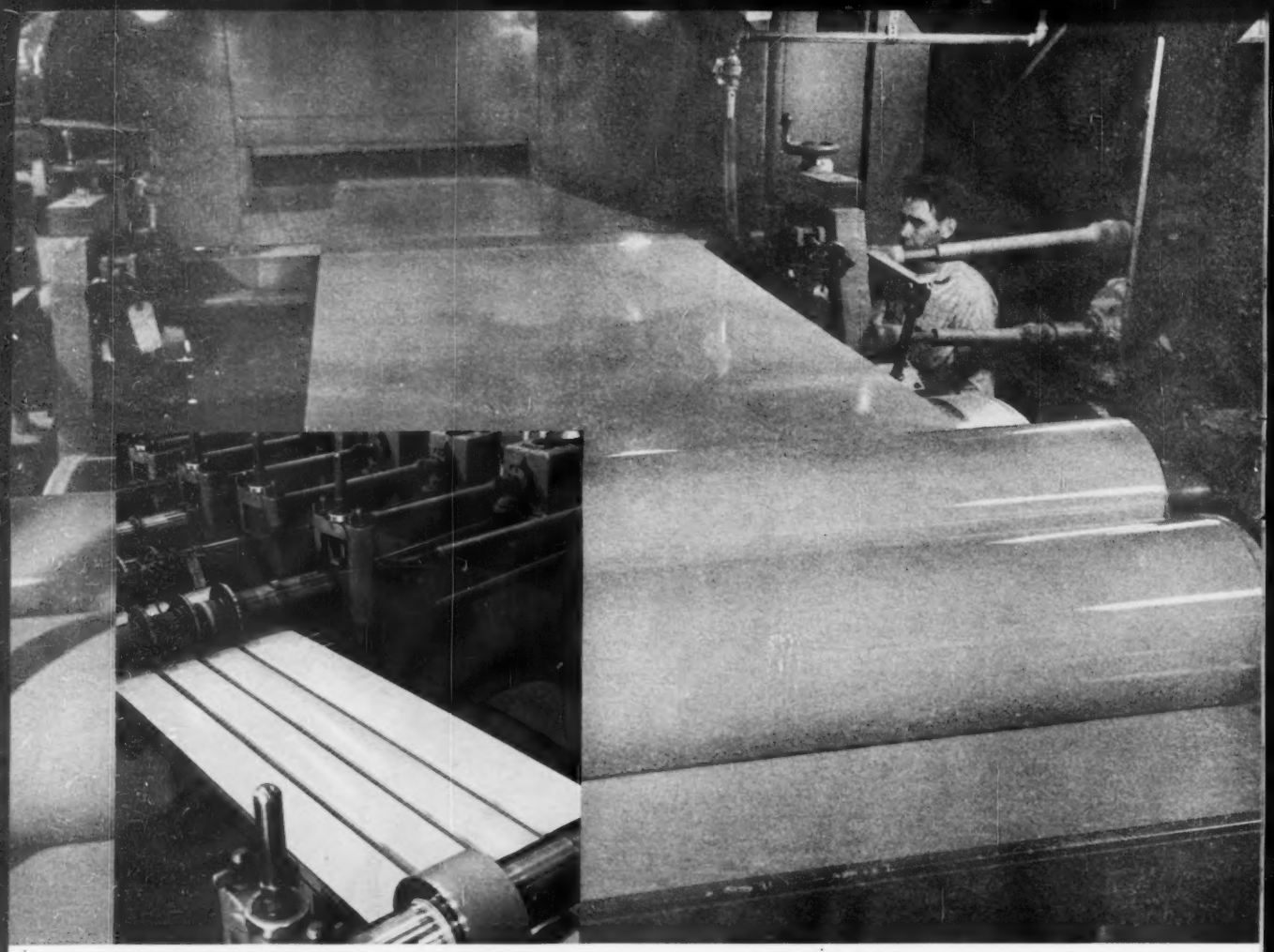

Glidden coating withstands stresses of continuous forming without cracking, chipping or film failure.

Coil coating line accelerates roof deck finishing to 125 feet per minute for Wheeling Steel

Wheeling Steel Corporation decided to convert their roof deck fabricating operation to continuous roll forming.

Problem they pitched at Glidden Technical Service Representatives: "Can you engineer a coating system to fit into this operation?"

They could and did.

Glidden recommended and worked with Wheeling engineers in developing and installing a continuous coil coating line. Result was a 5-stage power washer, reverse roll coater that coats both sides simultaneously and a 4-stage bake oven with coating speeds to 125 feet per minute.

This system actually resulted in a better surface preparation and finish than before, and the recommended Glidden coating exhibited excellent abrasion resistance and flexibility during recoiling and forming.

The experiences and resources of Glidden Technical Service are available to you in developing the best coating system for your particular needs.

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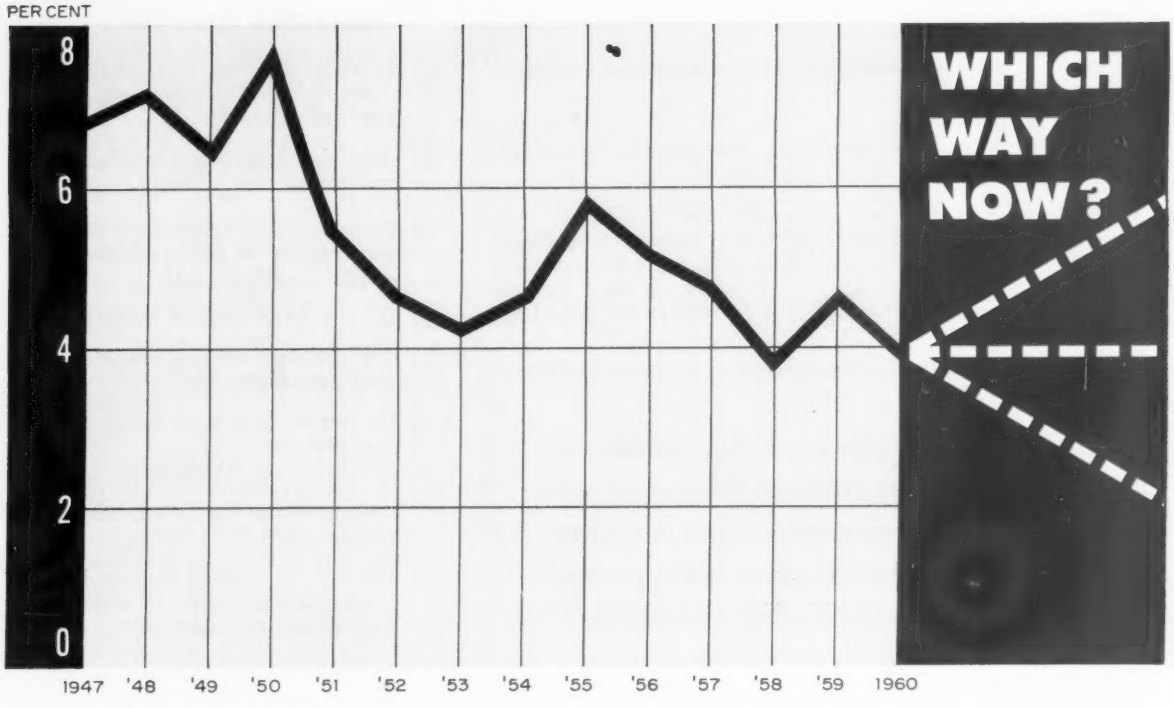
COATINGS AND RESINS DIVISION

900 Union Commerce Building • Cleveland 14, Ohio

In Canada: The Glidden Company, Ltd., Toronto, Ontario

Metalworking's Profit Margins

(Percentage of aftertax profit per dollar of sales for all metalworking corporations)



A Checklist for Profit Growth

This is the last article in STEEL's Profit Growth series. It serves as a checklist of steps to take in your journey to profit improvement. The steps are based on the successful practices of top metalworking companies.

HERE ARE 64 suggestions for you to implement in your company. All are aimed at one end—profit improvement. The adoption of any one could bring about a dramatic change in your company's profit picture. And, of course, you stand to improve your personal position if you glean from this list those suggestions most needed by your company—and successfully sell the ideas to the other members of your management team.

The 64 approaches to profit growth have a special significance at this time because . . .

• Metalworking's net profits per dollar of sales have averaged only 4.4 per cent during the last four years vs. 7.1 per cent in the early postwar years (1947-50).

• Metalworking is getting a smaller share of the buying dollar. Durable

"One of the more wasteful things industry indulges in today is to force people to run down a long narrow tube, learning more and more about less and less. When time comes to pick a manager, you have only a surplus of specialists."

JOHN PAUL JONES
Union Carbide Corp.

goods have lost ground to services and nondurables.

• Nonmetallics are challenging metals in traditional markets. And they're often taking jobs away. Example: Per capita consumption of steel dropped from 931 lb in 1950 to 796 lb in 1960,

"Too damn many people in business are trying to solve the wrong problems. They can't seem to differentiate between essentials and nonessentials. That's why industry hasn't come up with enough new products that really excite the buyer."

JUDSON S. SAYRE
Norge Div., Borg-Warner Corp.

while per capita use of plastics rose from 14.2 lb to 34.2 lb.

• We have failed to reach our potential in the world market. While the U. S. exports about $100 worth of products per capita, West Germany exports at double that rate, and such nations as Canada, Belgium, Switzerland, Holland, and Sweden do three times as well.

• The pressure of wages is severe. This year, each dollar spent by metalworking for employment costs will generate about $2.60 in sales; in 1950, each dollar in employment costs generated $4 worth of sales.

• Metalworking is wasting around $7 billion each year due to insufficent control over indirect labor costs. The productivity of indirect workers is generally below 60 per cent.

• Pressure from idle capacity, which forces unit costs up and prices down, has seriously damaged profits.

Those are the seven main causes of metalworking's profit problem. This checklist of suggestions is aimed at attacking those causes.

MANAGING FOR PROFIT

- ☐ Is your thinking and planning aimed at improved profits—or only improved volume?
- ☐ Have you developed a satisfactory replacement for yourself?
- ☐ Do you really delegate as much responsibility — and authority — as you should?
- ☐ Do you have clearcut objectives?
- ☐ Can you clearly define your role in your company?
- ☐ Do you waste time on pseudobusiness projects?
- ☐ Do you communicate your objectives down the line in a clear, definitive manner?
- ☐ Are you too involved in your daily routine to concentrate on effective long range planning?
- ☐ Are you regularly getting the kind of clear, up-to-date information you need to meet your responsibilities? Do your subordinates get that information?
- ☐ Do you have a code of ethics? Do you stick to it?

INNOVATING FOR PROFIT

- ☐ Can you identify the creative people on your staff?
- ☐ Have you given them the proper climate in which to work—one that stimulates thought and creative effort?
- ☐ Is there a clear path the idea man can follow to get his ideas to the right people in your organization?
- ☐ Do you have an organizational unit with the prime responsibility of studying where your company should be five and ten years from now?
- ☐ Are you examining new areas of technology (thermoelectricity, ul-

trasonics, cryogenics, nucleonics, molectronics, others) that might affect your products?

- ☐ Are you examining new markets (space, salt water conversion, leisure, others)?
- ☐ Are you willing to gamble on new ideas?
- ☐ Do you keep abreast of sociological trends that open economic opportunities?
- ☐ Does half your sales volume come from products developed in the last decade?
- ☐ Do all the managerial and professional people in your organization know what product fields are of prime interest to your firm?
- ☐ In developing new products, are you aiming at features—or just gimmicks?

DESIGNING FOR PROFIT

- ☐ Do your engineers have the information they need, the capacity to use it, and enough time to make the best decisions?
- ☐ Do your designers understand their jobs? Are responsibilities clearly defined? Do jobs overlap too much?
- ☐ Do you program and schedule engineering work?
- ☐ Do your engineers have the freedom they need?
- ☐ Do you have a concerted approach to product reliability?
- ☐ Do your people understand the relationship between complexity and reliability?
- ☐ Do your products require less service than they did three years ago?
- ☐ Do you establish qualitative goals for your people?
- ☐ Do you have modern testing and inspection equipment?
- ☐ Do you ever overdesign?

MARKETING FOR PROFIT

- ☐ Do you have an effective market research program?
- ☐ Is your sales forecasting reasonably accurate?

"During the next 60 seconds, 2000 pages of books, periodicals, or reports will have been published. If you attempted to keep fully informed on everything, by reading, you would fall behind 1.1 billion pages for every year you read."

ALLEN KENT
Western Reserve University

- ☐ Have you organized a concentrated attack on inefficiency in marketing and distribution?
- ☐ Does your sales incentive plan really generate greater profit?
- ☐ Is your entire organization customer oriented?

"One way to increase profits is to cut costs. But the purpose of the old 'economy drive' quickly gets lost because everything within striking distance gets economized. The key is to stop spending useless money and spend more useful money."

DON G. MITCHELL
General Telephone & Electronics Corp.

- ☐ Do you employ distribution cost analysis techniques?
- ☐ Have you considered a systems approach to marketing?
- ☐ Would the product manager concept pay off for you?
- ☐ Are you getting a share of the burgeoning government market?
- ☐ Do you know the details of selling to government bodies?

EXPORTING FOR PROFIT

- ☐ Do you export? If not, why not?
- ☐ In how many of the world's 18 highly industrialized nations do you sell?
- ☐ Have you investigated your poten-

tial in the underdeveloped nations?

- ☐ Do you design for overseas markets?
- ☐ Do you know the differences in overseas markets that will affect your sales there—such things as customs, traditions, religious concepts, prides and prejudices, cultural attitudes, financial practices, commercial usages?
- ☐ Have you investigated licensing possibilities?

"Our trend (in the U. S.) is to replace creativity by numbers, to replace quality with quantity. Our reasoning is analogous to saying that if one woman can produce a child in nine months, nine women will produce it in one."

DR. ALBERT SZENT GYORGYI
Nobel prize winner

COMMUNICATING FOR PROFIT

- ☐ Do you have an organized method to keep abreast of those technological changes that will affect your business?
- ☐ Have you considered the use of machine searching of technical literature?
- ☐ Do you have a way of obtaining information on what your overseas counterparts are doing?
- ☐ Do you keep employees informed on those factors that will affect their morale—financial, competition, the economy, community service, education, labor matters, new products, fringe benefits, and the like?
- ☐ Do you talk to employees about what you are for—or what you are against?
- ☐ Are you honest in your communications with employees? Are you sincere?
- ☐ Do you stand for what is right when it is uncomfortable, as well as when it is convenient?
- ☐ Are your employee communications on a continuing basis—or do you only try to put out fires?
- ☐ Are you willing to buy talent to carry out your communication objectives?
- ☐ Do you meet your responsibilities in the economic education of employees?
- ☐ Do you report financial information in an understandable form? (For example: Do you call dividends "payment for the use of the tools" and reinvested earnings "spending for new products, new facilities, and better working conditions?")
- ☐ Are you really trying to get labor's co-operation through joint committees, conferences, and meetings away from the bargaining table?

CAMPAIGNING FOR PROFIT

- ☐ Are your people aware of the bad break U. S. industry gets on such matters as depreciation?
- ☐ Are you trying to get changes in laws that place you at a competitive disadvantage?
- ☐ Do you know personally your senator? Your congressman? Your state senator? Other state legislators? Governor? Mayor? City councilmen? Heads of regulatory agencies?
- ☐ Do you avail yourself of the help you can get from government offices like the Department of Commerce, Department of the Interior, and others?
- ☐ Do you encourage your men to play an active part in politics?

Those 64 questions should form a "thinking outline" for executives attempting to build a profit improvement program. (They were gleaned from the previous 24 articles in STEEL's 1961 Program for Management.) You might also use them to generate ideas in executive sessions or work simplification programs.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

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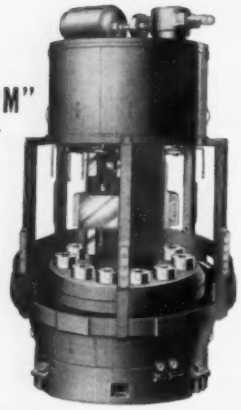

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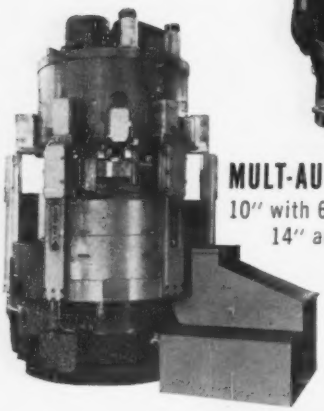

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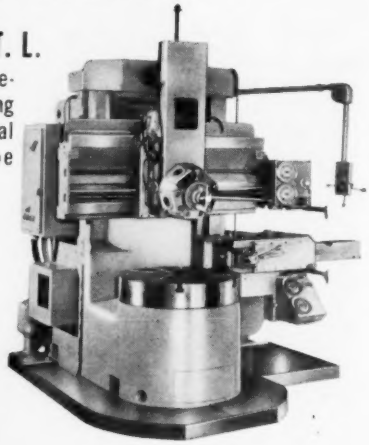

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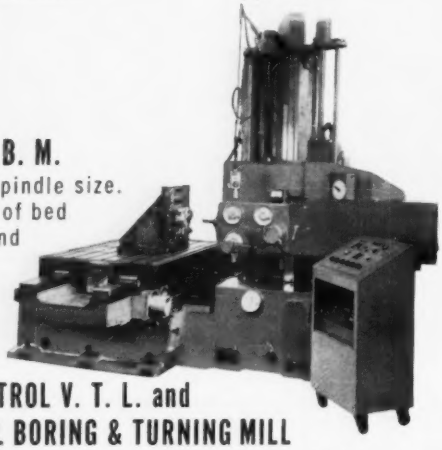

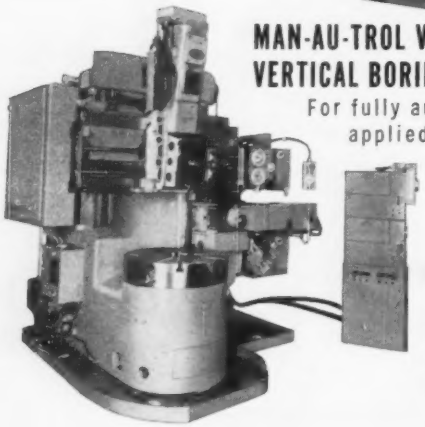

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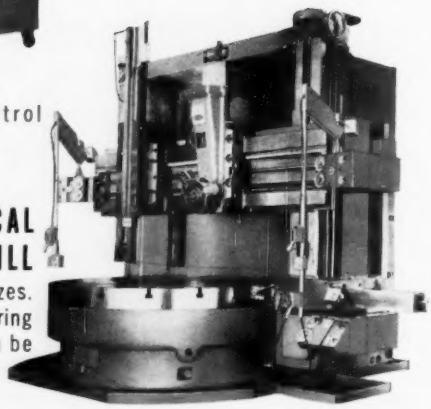

'62 Auto Sales May Top Production

NEW FORECASTS of calendar 1962 passenger car production and sales (see table, right) are optimistic. They're indicative of Detroit's thinking now that it has two full months of new model sales on which to base its judgment.

Forecasters now say that 1962 may shape up as one of those unusual years: Total factory sales will equal or exceed production. That has happened only three times in the last decade—1958, 1956, and 1954.

Since new models started appearing last September, four changes have occurred in the general economic climate that have caused carbuilders to alter earlier predictions: 1. Seasonally adjusted retail sales turned sharply upward in October. 2. Consumer savings have begun leveling off. 3. Consumer credit is on the rise. 4. Personal income is rising.

Result: November car sales totaled 584,993 units, a good 20,000 more than expected. Production and sales are now running at an annual rate of better than 7 million cars.

If production should reach the 6.8 million car forecast, metalworking will have sold to automakers about 11.5 millions tons of steel, 1.48 million tons of gray iron engine castings, 440 million lb of aluminum, and 520 million lb of zinc.

In his yearend statement, Henry Ford II, chairman, Ford Motor Co., sees new car sales continuing at a 7 million rate during the first half of 1962. That is upgrading the company's earlier forecasts—1962 sales of 6.8 million cars. It's more in line with General Motors Corp.'s prediction of a possible 7.25 million in car sales.

Passenger Cars—in Thousands

	1962	1961
Total retail auto sales	7,000	6,000
(−) Imports	400	375
	6,600	5,625
(+) Exports	130	130
	6,730	5,775
(−) Starting inventories	800	1,100
	5,930	4,655
(+) Yearend inventories	900	800
Total U. S. Production	**6,830**	**5,455**

• **Used Cars—Indicator** — Economists like Ford Div.'s Robert J. Eggert believe used car prices directly affect new car sales. Since early in 1961, the average price of used cars has moved to $1227, a five year high. High used car prices reduce the cost to trade for new cars. Although the index shows signs of turning downward, automakers feel it will have little effect on dealers' willingness to trade. Mr. Ford says used car sales are expected to reach 8.8 million units next year. That's 500,000 more than the 1961 total. He predicts they'll exceed 9 million if new car sales approach the 7 million mark.

• **Trouble Spots Indefinite** — It's tough to relate some of next year's economic weak points to consumers' willingness to buy. Loans to businessmen are slower than normal, but it's debatable whether that will bother the average man who wants to buy a new car or any household item.

The possibility of a steel strike next June is not considered as a damper on car sales by Detroit. Some auto executives feel that if a walkout comes it won't be a long one. Customers won't have time to become disheartened and freeze up on spending, predict the executives.

Rambler Builds Overseas

AMERICAN Motors Corp. is forecasting 22,000 overseas car sales next year compared with 7500 in 1961. That doesn't include another 18,000 cars it expects to sell in Canada. To reach its goal, the company is continuing to expand its foreign operations.

Latest moves include the establishment of an export corporation at Zug, Switzerland, to handle all overseas operations. An agreement between Renault and AMC will see Rambler Classics built in the French automaker's plant near Brussels, Belgium. Next month, the company will start building Ram-

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blers in Argentina, where it is affiliated with Industrias Kaiser Argentina. AMC also produces cars in Mexico, South Africa, Australia, Malta, and New Zealand. It makes Kelvinator appliances in England, Italy, and Canada. It builds compressors in Italy and Japan.

Roy D. Chapin Jr., AMC executive vice president who heads up the export corporation, says that half of the $3.5 million being invested in Argentina will be used to establish a financing organization. "Most of the South American countries haven't yet caught on to our methods of credit buying. There's no point in building cars down there if we can't set up a system so people can buy them," he tells STEEL.

Mr. Chapin also says Rambler anticipates little difficulty in meeting Argentine content provisions which require that 95 per cent of the automobile be manufactured locally within three years. Reason: Kaiser already makes a power train and other chassis components for its cars that fit Ramblers. "All we'll have to do is set up sheet metal facilities," Mr. Chapin remarks.

In its deal with Renault, Rambler is aiming at Common Market countries. George Romney, AMC president, says those countries now control a fourth of the Free World trade.

How World's Car Population Is Growing

	Cars in Use (Thousands) 1950	1960(a)	Percentage Increase	Cars in Use per 1000 persons, 1960
Austria	44	407	825	57
Japan	43	372	765	4
Germany	601	4,681	679	84
Sweden	253	1,243	391	166
Italy	444	2,041	360	41
Venezuela	57	239	319	36
France	1,600	6,158	285	135
Mexico	161	475	195	14
Belgium	274	726	165	79
Uruguay	40	106	165	37
Ceylon	34	83	144	8
United Kingdom	2,362	5,677	140	108
Australia	877	1,913	118	186
Brazil	238	502	111	8
New Zealand	254	511	101	215
South Africa	462	863	87	54
India	146	237	62	0.5
United States	40,315	61,270	52	339
Egypt	60	71	18	3

(a) Partly estimated.
Source: First National City Bank of New York.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,191	434,377
August	195,266	305,514
September	354,711	407,691
October	557,200	617,972
November	646,015	597,638
11 mo. Totals	4,929,100	6,172,686
December		523,422
Total		6,696,108

Week Ended	1961	1960
Nov. 11	152,286	138,682
Nov. 18	154,230	149,753
Nov. 25	124,292	111,091
Dec. 2	164,834	135,348
Dec. 9	161,700†	135,328
Dec. 16	160,000*	130,711

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

AUTO INDUSTRY SUPPLIERS with a yen to enlarge their markets should examine the table above, prepared by First National City Bank of New York's Foreign Information Service.

It shows where the world's car population is growing fastest, giving an indication of where demand for components — and for replacement parts—is accelerating.

The number of passenger cars in use around the world passed the 100 million mark this year. There are now better than 33 cars for 1000 people, world-wide. That figure, of course, is heavily weighted by the U. S. average of 339 cars per 1000 persons. (These figures omit 25 million trucks and buses in use around the world.)

Broadly speaking, the impressive rise in the auto population outside the U. S. during the past decade can be attributed to three major factors:

1. Most important, and still gaining in importance, has been the growth of internal mass markets.

2. Next in importance, says First National City Bank, has been the development of mass car production abroad, which made possible lower costs and the widening of internal—and export—markets.

3. The third factor was the development in Western Europe and Japan of a popular vehicle, more suited to local conditions than the traditional American car.

Those three factors have sent overseas auto production skyrocketing. Here's the bank's rundown on 1960 passenger car production in selected Free World countries (in millions of units):

U. S. A.	6.67
Germany	1.68
United Kingdom	1.35
France	1.12
Italy	0.60
Canada	0.33
Japan	0.17
Australia	0.15
Sweden	0.11

Ernst cuts steel costs to customers up to 10% with three new Wean Coil Processing Lines

During a recent call on Ernst Iron Works, Division of Ernst Steel Corporation, Jim Moon, sales engineer of McKay Machine (above left), talked with Carl Grosse, plant superintendent, about the three Wean coil processing lines recently installed by this major metals warehousing firm.

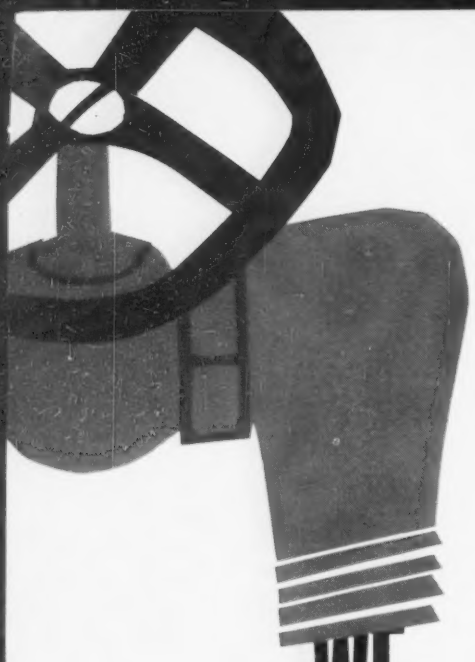
According to Mr. Grosse, the Wean slitting, shearing and coil banding lines have reduced Ernst's handling, labor and scrap costs up to 10%. In addition to providing lower costs to Ernst's customers, this modern coil processing system helps this firm give fast service while easing inventory and supply problems through the purchase of standard size coils.

Equipped with modern, automatic controls, the Wean coil processing lines are operated by only four men and can handle 20,000 lb. coils, up to 54" wide and from .015" to .135" thick.

The McKay Machine Company, Youngstown 1, Ohio

The McKay Machine Company is licensed to manufacture, sell and service metal processing machinery formerly manufactured by Wean Equipment Corporation, Cleveland, Ohio.

McKAY McK MACHINE



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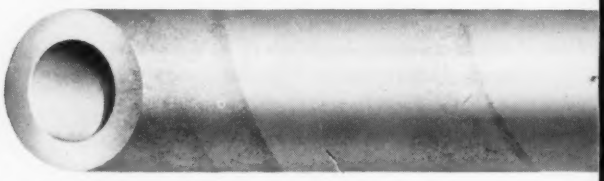

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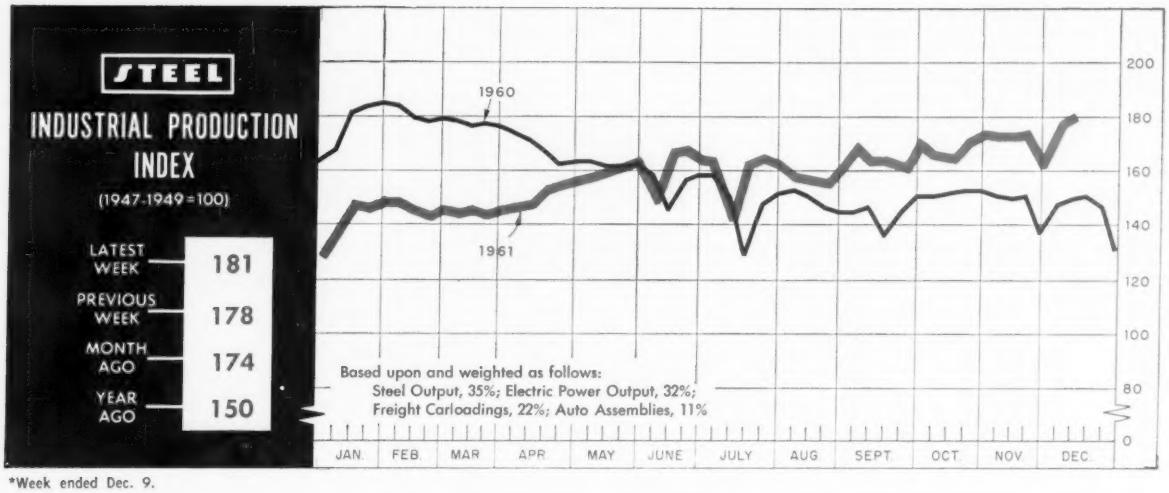

*Week ended Dec. 9.

Business Indicators Spur Optimism

AS 1961 CLOSES, confidence in the business outlook is rising to the highest peak since the final weeks of the 1950 decade. Practically all the "popular" business indicators are pointing strongly upward; some are already setting all-time highs.

There are still some doubtful segments in the nation's economy, but most of them involve elements which the "common" man either does not understand or care about. In generating optimism or pessimism, those areas score heaviest which have the most direct bearing on the casual observer because he can understand them or identify himself with them. And those indicators—such as auto sales, employment, retail sales, construction steel production—are better than they have been in a long time.

● **Common Denominator**—Rightly or wrongly, auto sales are probably the most closely watched of all the indicators—when they're up, the feeling is that things are good; when they're down, they put a damper on the outlook. Right now, they're up. November sales were the best in over six years. There apparently is no softening in December. Production schedules are geared to a continuation of the fast sales trend right through the first half of 1962.

● **Close Second**—Steel output is nearly as important in its impact on confidence. Output of the nation's mills has been moving steadily upward since Thanksgiving, and it should continue that direction right up to the labor contract deadline next July 1.

In the week ended Dec. 9, ingot production totaled 2,158,000 net tons, the highest level since the last week of April, 1960. Last week (ended Dec. 16), it was close to 2.2 million tons. Already, there is talk about how long it will take the industry to return to the extremely high levels—2.6 million to 2.7 mil-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,200[1]	2,158	1,387
Electric Power Distributed (million kw-hr)	16,200[1]	15,954	15,013
Bituminous Coal Output (1000 tons)	8,880[1]	7,345	7,542
Crude Oil Production (daily avg—1000 bbl)	7,200[1]	7,198	7,152
Construction Volume (*ENR*—millions)	$316.9	$449.8	$446.1
Auto, Truck Output—U. S., Canada (*Ward's*)	198,930[1]	201,400	165,971
TRADE			
Freight Carloadings (1000 cars)	565[1]	574	518
Intercity Truck Tonnage (changes from year ago)	+9.6%	+9.2%	−5.5%
Business Failures (Dun & Bradstreet)	356	238	290
Currency in Circulation (millions)[2]	$33,578	$33,504	$32,722
Dept. Store Sales (changes from year ago)[2]	+3%	+7%	−7%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$30,875	$24,555	$27,287
Federal Gross Debt (billions)	$297.3	$297.7	$290.6
Bond Volume, NYSE (millions)	$35.9	$33.6	$31.0
Stocks Sales, NYSE (thousands of shares)	21,011	22,283	18,315
Loans & Investments (billions, adjusted)[3]	$117.3	$117.3	$108.7
U. S. Govt. Obligations Held (billions)[3]	$33.9	$33.9	$29.7
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	224.2	224.7	221.5
All Commodities[6]	118.8	118.8	119.5
Commodities Other than Farm & Foods[6]	127.5	127.5	127.9

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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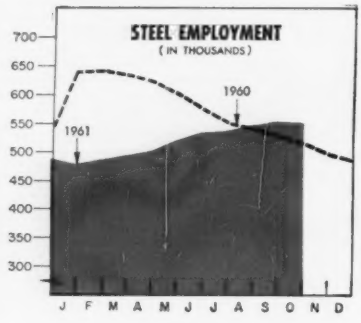
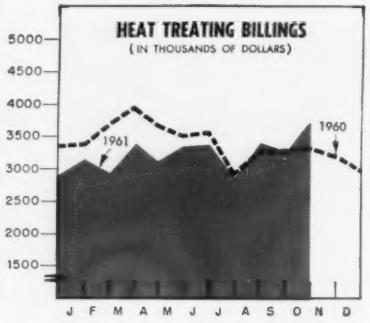
THE BUSINESS TREND





	Employment In Thousands		Payroll In Millions	
	1961	1960	1961	1960
Jan.	478	641	$274.9	$398.8
Feb.	484	643	267.1	381.4
Mar.	492	637	298.1	398.8
Apr.	501	626	292.0	357.2
May	519	604	326.2	339.8
June	532	580	321.1	316.0
July	538	554	307.0	287.0
Aug.	545	543	336.8	300.3
Sept.	551	531	332.6	287.2
Oct.	550	516	355.3	284.8
Nov.	...	499	....	270.4
Dec.	...	486	....	267.9

American Iron & Steel Institute.
Charts copyright, 1961, STEEL.

	1961	1960	1959
Jan.	3,171.6	3,381.6	2,769.1
Feb.	2,942.3	3,698.8	2,828.0
Mar.	3,393.3	3,921.9	3,273.8
Apr.	3,140.9	3,642.6	3,316.1
May	3,370.4	3,594.3	3,302.8
June	3,386.8	3,546.7	3,512.2
July	2,880.8	2,906.5	3,302.1
Aug.	3,389.4	3,280.7	3,162.8
Sept.	3,325.9	3,323.5	3,263.8
Oct.	3,723.2	3,350.9	3,531.2
Nov.	.....	3,165.5	3,092.2
Dec.	.....	2,925.2	3,357.2

Metal Treating Institute.

lion tons—following the settlement of the last steel strike.

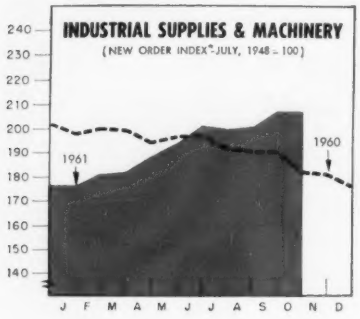
• **More Working**—One of the indicators which has caused much concern about the economy—employment—finally seems to be moving upward. In November, total employment moved up to 67.3 million, the highest figure on record for the month. And unemployment, which remained fairly unaffected by economic developments for 11 months, declined from around 7 per cent to 6.1 per cent of the labor force, seasonally adjusted. It was the sharpest drop since 1958 and could go a long way to bolstering consumer morale if it is continued.

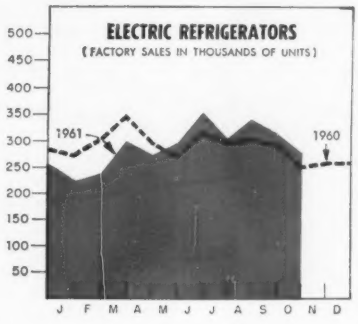
• **More Building**—New construction put in place also reached a record high in November. It totaled $5.1 billion, or a seasonally adjusted annual rate of $59.5 billion. The big gain came in residential construction, the area most directly tied to the consumer. While contracts for future construction have been weak in the last couple of weeks, this is not likely to dampen the optimism caused by the sight of men working on an increasing number of new houses, buildings, and roads.

• **Big Payoff**—Those developments have contributed to one of the sharpest rises in consumer buying in recent years. Consumer buying and business spending for capital goods (see Page 85)—were big question marks in many earlier forecasts for 1962. No more. Retail sales in November climbed well past the previous record (April, 1960) to reach a seasonally adjusted $19.27 billion. It was the second consecutive month in which a 3 per cent gain was chalked up, and it confirms the report in this column on Nov. 27 that October marked the beginning of a sustained uptrend.

Another record in December seems almost a certainty. Weekly reports on department store sales so far this month show substantial gains over the year-ago levels, and this is the first Christmas season in several years in which merchants have not experienced lower than expected business volume. Sales may run 7 per cent ahead of last year's all-time best holiday season. Stocks are becoming thin, with rush orders to the factories the rule rather than the exception.

The majority of retailers recently polled by Dun & Bradstreet Inc. believe the improvement will move on into 1962. During the first half,





	1961	1960	1959	1958
Jan.	176	198	186	163
Feb.	181	200	202	157
Mar.	182	199	221	149
Apr.	188	194	218	148
May	194	196	218	152
June	201	197	212	164
July	200	191	216	170
Aug.	201	190	212	172
Sept.	207	190	207	178
Oct.	207	182	204	187
Nov.	...	181	202	189
Dec.	...	176	202	190

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.

	1961	1960	1959
Jan.	225,700	272,100	256,200
Feb.	239,000	308,500	306,200
Mar.	300,000	345,000	333,700
Apr.	273,900	300,000	301,000
May	294,300	273,400	308,200
June	353,400	314,700	361,000
July	304,700	297,400	370,800
Aug.	340,200	307,500	314,100
Sept.	316,500	290,700	355,700
Oct.	278,200	249,200	329,600
Nov.	.....	258,400	265,900
Dec.	.....	258,100	282,600
Totals	.....	3,475,000	3,785,000

National Electrical Mfrs. Assn.

gains will measure between 5 and 10 per cent, they say.

Record Year Despite Dip

Despite the recession in the early part of the year, 1961 will go into the record books as the best year to date. It will be the third in a row to mark a new high in over-all production. The Federal Reserve Board's industrial production index will average about 109 (1957 = 100) following 108 and 105 in the two previous years. Gross national product will advance for the seventh consecutive year to about $520 billion. With the outlook for next year so uniformly good, it may be said that we are currently in the longest period of expansion in the postwar era—based on annual averages.

Forecasts Holding Up

There has been a feeling lately that businessmen and economists have tempered their 1962 forecasts as a result of the slowdown in the third quarter. But when the facts are presented, the charge proves to be unfounded. Take the forecast of James M. Dawson, vice president and economist for Cleveland's National City Bank (he terms it a "standard forecast") and compare it with that of STEEL's Panel of Economic Consultants presented in the Oct. 2 issue.

On Dec. 5, Mr. Dawson forecast GNP for 1962 at $560 billion (vs. the panel's $558 billion). He put the FRB index at 120 for the year (same as the panel's). Plant and equipment expenditures should be "about $38 billion," he said. (The panel said $37.6 billion.) Total new housing starts should be up 5 per cent, or a little over 1.4 million units for the year (vs. 1.4 million). On auto production, Mr. Dawson has consistently been above the "standard" forecast with a figure of 7 million units (vs. 6.5 million).

The bank economist also makes the following predictions:

- **Corporate Profits**—Pretax profits should climb from this year's $45 billion to a record $53 billion or more next year. Dividends should top $15 billion compared with an expected record of $14.3 billion in 1961.

- **Inventories**—Next year will see an addition of $6 billion to business stocks, with the most rapid rate in the first half.

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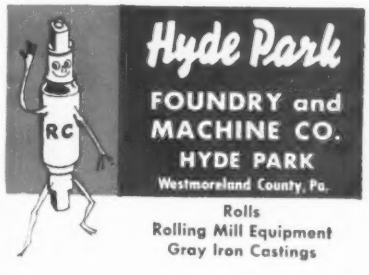

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HAMILTON E. HAYNE
USI Robodyne v. p.

MARVIN R. ANDERSON
Ex-Cell-O v. p.

CHARLES B. SEELIG
LeTourneau-Westinghouse mgr.

HARRISON C. STACKPOLE
Stackpole Carbon pres.

Hamilton E. Hayne was appointed vice president-marketing, **USI Robodyne Div.**, Silver Spring, Md., U. S. Industries Inc. He formerly was a vice president in the Marketing Dept. of Brown & Bigelow.

Marvin R. Anderson was elected a vice president of **Ex-Cell-O Corp.**, Detroit. He retains the presidency of the subsidiary, Michigan Tool Co. As vice president, he assumes additional administrative responsibilities in product lines common to the parent and subsidiary companies.

Dr. Elmer W. Engstrom was elected president of **Radio Corp. of America**, New York. Former senior executive vice president, he succeeds **John L. Burns**, resigned. Mr. Burns will serve on special assignments from Chairman David Sarnoff.

Colorado Fuel & Iron Corp., Denver, elected **Sam A. Ott** vice president-operations; **William Brill** vice president-engineering.

Charles B. Seelig, former marketing manager for General Electric Co., was named vice president-marketing, **LeTourneau-Westinghouse Co.**, Peoria, Ill.

Mullins Mfg. Corp., newly formed company in Warren, Ohio, elected the following officers: **Robert Potter** president; **Sigmund Morey** chairman; **Leonard Morey, Harry Howell, Harold O. Smith,** and **Harry Krohne** vice presidents. The company also announces acquisition of Youngstown Kitchen Div. of American Radiator & Standard Sanitary Corp.

Paul B. Wishart, president of **Minneapolis-Honeywell Regulator Co.**, Minneapolis, was elected chairman and chief executive officer to succeed **Harold W. Sweatt**, named chairman of the finance committee. **James H. Binger** was elected to succeed Mr. Wishart as president. **Stephen F. Keating** was elected an executive vice president.

Harrison C. Stackpole was elected president of **Stackpole Carbon Co.**, St. Marys, Pa. **Harry S. Conrad** resigns as president but remains as vice chairman of the board and chairman of the executive committee. **George E. Ritter** was elected executive vice president.

Robert E. Steinman was named president of **Gaertner Scientific Corp.**, Chicago. He succeeds the late **Dr. S. Jacobsohn**. Mr. Steinman joined Gaertner in January, 1960, as administrative vice president. He was with Charles Bruning Co. Inc.

Avondale Shipyards Inc., New Orleans, appointed **Roy Perrin** director of purchases. **Robert Cowart**, former general sales manager of the **Avoncraft Div.**, was made manager, and is succeeded as sales manager by **George Fletcher**.

Norman B. Schmidt was made assistant metallurgist-stainless steels

SAM A. OTT

WILLIAM BRILL
CF&I elects vice presidents

PAUL B. WISHART

JAMES H. BINGER
Minneapolis-Honeywell chairman, president

W. KENT MATHIAS

JOHN E. LYNCH

ROBERT C. BEVIS

JAMES A. D. GEIER

Cincinnati Milling Machine executive promotions

by **Carpenter Steel Co.**, Reading, Pa.

Raymond A. Wolf Jr. joined **Pangborn Corp.**, Hagerstown, Md., as assistant to the vice president, Vibratory Finishing Div.

Thomas W. Russell Jr. was elected president of **Dominion Brake Shoe Co. Ltd.**, Canadian subsidiary of American Brake Shoe Co., New York. He continues as a vice president of the parent company, and was named to its management committee. Mr. Russell succeeds **Kenneth T. Fawcett**, who was granted a leave of absence from Dominion Brake Shoe for reasons of health.

Republic Steel Corp. appointed **J. R. Lowey** manager of its South District plant in Gadsden, Ala. He is succeeded as assistant manager, Cleveland District plant, by **E. W. Carlson. Charles W. Barrett** was made manager, Buffalo District plant to succeed Mr. Carlson. **Edward F. Lee** was made assistant manager, Milwaukee District sales office.

Robert S. Brinker, former director of purchases, **Spang & Co.**, Butler, Pa., was made assistant manager of operations of Spang and its affiliates, Ferroslag Process Corp., and Butler Refractories.

Richard L. Engel fills the new post of general manager-sales and service for the Industries Group of **Allis-Chalmers Mfg. Co.**, Milwaukee. He is succeeded as manager of the Pacific region by **T. E. Meyers.**

William L. Neal was appointed product manager by **Dytronics Inc.**, Rochester, Mich. He was with Kaiser Aluminum Co. in Detroit.

Cincinnati Milling Machine Co., Cincinnati, appointed **W. Kent Mathias** general sales manager; **John E. Lynch** domestic sales manager; **Robert C. Bevis** manager of the Milling Machine Div.; and **James A. D. Geier** manager of the Grinding Machine Div. Messrs. Mathias and Bevis are vice presidents of Cincinnati Milling & Grinding Machines Inc. Mr. Lynch, who succeeds Mr. Bevis as domestic sales manager, has held responsible positions in Cincinnati since 1954. Mr. Geier was vice president-general manager of Cincinnati Lathe & Tool Co., associate company.

Frank A. Staples Jr. was made Western area manager, Metals Div., **National Research Corp.** He has offices in Palo Alto, Calif.

C. T. Stott, general manager of **Bethlehem Steel Co.'s** Sparrows Point, Md., plant, assumes new duties as assistant vice president-Steel Div., and general manager of the Bethlehem, Pa., plant. He succeeds **V. J. Pazzetti Jr.**, retired. **W. G. Smith**, general manager of the Lackawanna, N. Y., plant, succeeds Mr. Stott as general manager at Sparrows Point. **R. S. Bennett** succeeds Mr. Smith.

Joseph A. Ricca joined **Ford Motor Co.'s** Aeronutronic Div., Newport Beach, Calif., as manager of planning for electronics. He was a management consultant. **Steig Gavelin** was made manager of marketing-electronics.

David W. Pertschuk was named director of reliability and quality assurance for the Aircraft-Missiles Div. of **Fairchild Stratos Corp.**, Hagerstown, Md. He previously headed those activities for Precision Products Dept., Nortronics Div., Northrop Corp.

Clare J. Rawson was made plant manager of **Veritron West Inc.**, North Hollywood, Calif., subsidiary of Alloys Unlimited Inc. He was with Motorola Inc.'s Semiconductor Products Div. in Phoenix, Ariz.

C. T. STOTT

W. G. SMITH

R. S. BENNETT

Bethlehem Steel plant managers

W. W. Hanahan was made assistant to the president of **Weirton Steel Div.**, Weirton, W. Va., of **National Steel Corp.** He is in charge of special engineering projects, including smoke abatement and facility planning. **L. A. Fugassi**, chief engineer of the Midwest Steel Div. of National Steel, was named assistant vice president-engineering of the parent company. At Weirton, two new posts are filled by **Joseph M. Bendot** as assistant chief engineer-steelmaking facilities; and **J. W. Martt** as assistant chief engineer-finishing facilities.

R. A. Cary was made chief metallurgist, **Vanadium-Alloys Steel Co.**, Latrobe, Pa. He was director of process metallurgy.

Myron Hawley was made manufacturing manager, Industrial Products Div., **Westinghouse Air Brake Co.**, Wilmerding, Pa. He was factory manager of the Ithaca, N. Y., plant of Morse Chain Div., Borg-Warner Corp., and during the last year, served as a private consultant.

John H. DeVries was named vice president of **Gulf & Western**, Houston. He is president of Michigan Plating & Stamping Co., subsidiary in Grand Rapids, Mich.

William N. Kiely was named sales manager for **Temescal Metallurgical Corp.**, Berkeley, Calif. He was West Coast sales manager, Special Metals Inc.

Carl Gloskey was appointed general manager, Chemicals Div., **Metal & Thermit Corp.**, New York. He was manager of M&T's Process Development Div.

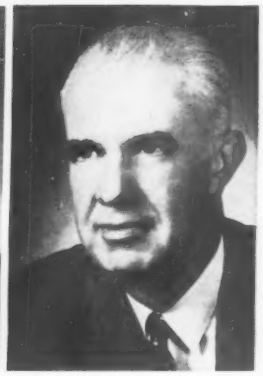
Norman R. Brown was named director of reliability for **Westinghouse Electric Corp.'s** Motor & Gearing Dept., Buffalo.

Conner Bachman was made assistant general manager, California Div., **Anadite Inc.**, South Gate, Calif. **Charles Kish** was made plant manager for all of Anadite's South Gate operations.

Thomas N. Peck was made sales manager of **Stranahan Foil Co. Inc.**, South Hackensack, N. J., subsidiary of Hydrometals Inc. He was a former manager of the Aluminum Div. of Vanadium Corp. of America.

W. W. HANAHAN
Weirton Steel post

R. A. CARY
Vanadium-Alloys chf. metall.



MYRON HAWLEY
Westinghouse Air Brake post

DONALD L. MAINS
Canton Malleable gen. mgr.

DR. WILFRED F. L. PLACE
Norton International v. p.

ALFRED G. HOFFER
Gisholt Machine v. p.

Donald L. Mains was made vice president and general manager, **Canton Malleable Iron Co.**, and **Canton Mfg. Co.**, Canton, Ohio. He was with Dayton Malleable Iron Co. as vice president-general manager, Ohio Malleable Div., Columbus, Ohio.

A. F. Thomson was made production manager, Adhesives, Coatings & Sealers Div., **Minnesota Mining & Mfg. Co.**, St. Paul.

John I. Ykema was named manager, Circuit Breaker Section, Switchgear Div., **I-T-E Circuit Breaker Co.**, Philadelphia. He was production engineering manager of the section.

W. Bennett Lewis was made manager of the general sales office of **Harbison-Walker Refractories Co.**, Pittsburgh.

Nylok Corp. appointed **Edward F. Brautigam** manager of its Midwest facility at Skokie, Ill.

Dr. Wilfred F. L. Place was elected vice president in charge of European operations for **Norton International Inc.** He has headquarters in Paris.

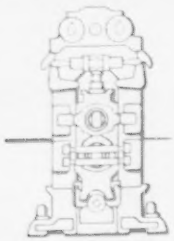
Alfred G. Hoffer was elected a vice president, **Gisholt Machine Co.**, Madison, Wis. He continues as works manager.

OBITUARIES...

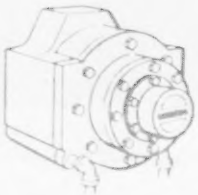
Herbert P. Bailey, 70, founder in 1927 of **Rotor Tool Co.**, Cleveland, died Dec. 5. When Rotor Tool merged with Cooper-Bessemer Corp. as a subsidiary in 1959, Mr. Bailey was named a C-B director and in 1961 became director emeritus.

Frederick W. Borchers, 65, general sales manager, **Bristol Co.**, Waterbury, Conn., died Dec. 5.

John W. Weaver, 52, vice president-general manager, Foundry Div., **Waukesha Foundry Co.**, Waukesha, Wis., died Nov. 30.

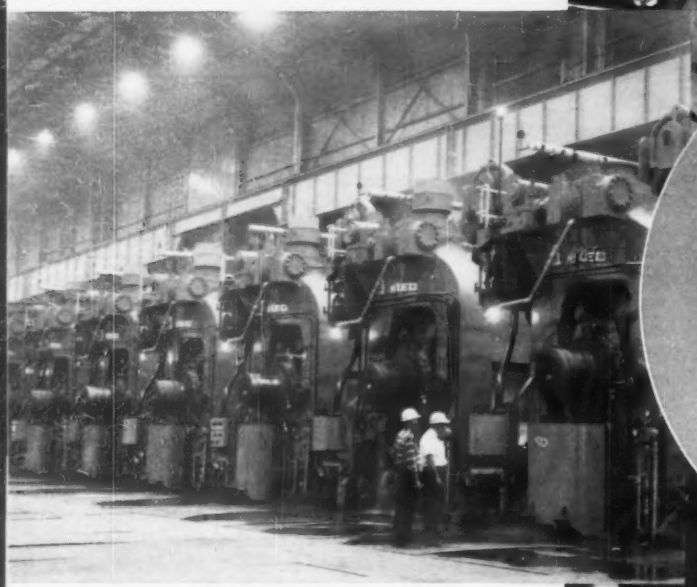


ROLLING MILLS

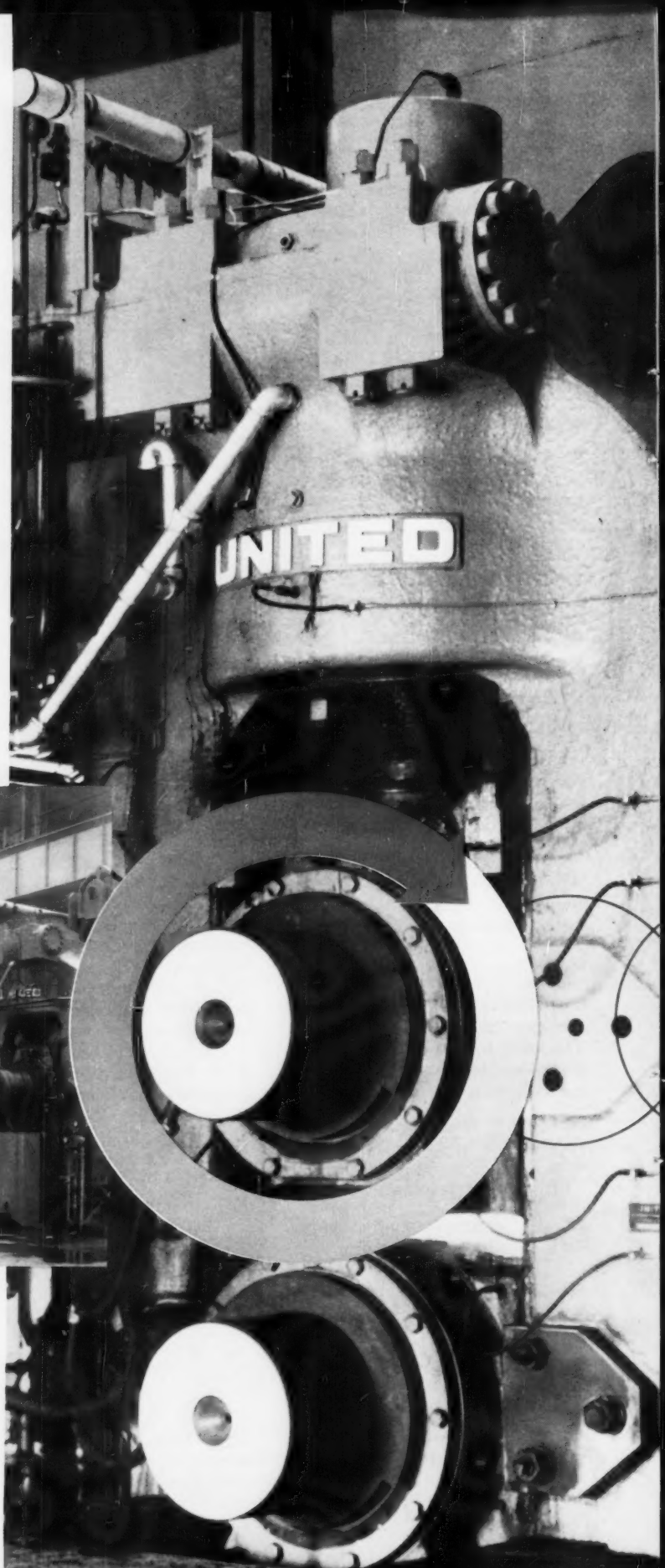


MORGOIL BEARINGS

WIRE DRAWING MACHINES



COMBUSTION CONTROL



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Mill stiffness is essential to precision gage control. Morgoil inherent design superiorities of unqualified capacity, high roll neck strength and chock rigidity create the stiffest possible mill without sacrificing bearing life or backup roll turndown.

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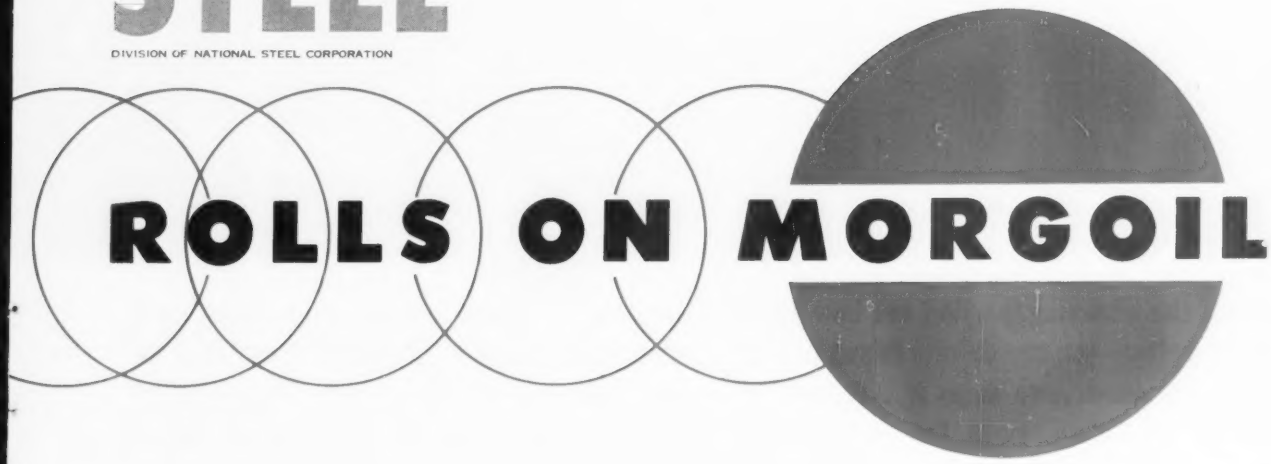
Lower over-all operating costs are a significant long-term Morgoil advantage. Lower initial costs constitute an additional sizable saving on each Morgoil installation.



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the world's most machinable steels **INLAND STEEL COMPANY**

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New Steel Plant Eliminates Need for Coke in Ironmaking

A $1.5 MILLION plant which produces high purity iron and steel by a process (Madaras) that eliminates the need for coking coal has been dedicated by Arkota Steel Corp., Coolidge, Ariz.

The plant and the firm's reserves of magnetite "black sand" iron ore at the Arkota mine combine to give Arizona its first mine-to-metal steel operation, says P. H. Feeney, president. Its annual capacity (25,000 tons) will be at least doubled by next year as additional equipment is installed.

"The distinguishing characteristic of Arkota's varied . . . products is their extreme accuracy in meeting exacting purity specification required by manufacturers of highly critical components with specialized functions in defense and normal industry," says Marnel Lindekugel, executive vice president. "For example, Arkota will be able to produce ultraclean melting stock of 99.8 per cent purity . . . for production of the premium tool, bearing, stainless, corrosion resistant, superalloy steels . . ."

The Madaras process uses only natural gas and electric power, eliminating the need for coke in making iron. The semicontinuous process permits removal of oxygen and sulfur from iron ore by means of a controlled mixture of hot hydrogen and carbon monoxide gases.

Wheatland Tube Expanding

Wheatland Tube Co., Philadelphia, has launched a $4 million, three year expansion and modernization program for its plant and production facilities at Wheatland, Pa. The first phase will be the construction of a 55,875 sq ft addition that will be in operation in January. The second phase will be the installation of an Aetna-Standard, high speed, continuous weld mill to be completed in late 1962. The mill will increase the plant's annual capacity to 180,000 tons of pipe. New zinc dust collecting equipment is being installed in the Galvanizing Dept., and space has been arranged for the installation of an additional galvanizing line in late 1962. Relocation of the Hot Dipped Galvanized Electrical Conduit Dept. and some equipment will provide space for additional finishing equipment in the Electric Weld Tube Dept. The entire program, including the installation of new finishing and threading equipment, will be completed in early 1964.

Cutler-Hammer Broadens Electrical Equipment Line

Cutler-Hammer Inc., Milwaukee, acquired two former divisions of Electric Machinery Mfg. Co., Minneapolis, a subsidiary of the Worthington Corp. Cutler-Hammer purchased Mullenbach Div., Los Angeles, and organized a wholly owned subsidiary, Uni-Bus Inc., to acquire Electric Distribution Products Inc., Allentown, Pa. Elmer T. Carlson is president of Uni-Bus Inc. Wayne M. Bitting is general manager of Mullenbach Div.

Alumina Plant Expanded

Kaiser Aluminum & Chemical Corp., Oakland, Calif., has completed expansion of facilities for the manufacture of tubular alumina products at its Baton Rouge, La., Works. The $750,000 project increases fivefold the company's capacity to produce the chemically inert and highly dense aluminum oxide.

Zagar Broadens Line

Zagar Inc., Euclid (Cleveland), Ohio, has assumed design, manufacturing, and distribution responsibilities for a high speed centering machine developed by Central Engineering Co., Racine, Wis.

Consolidates Operations

Cleveland Punch & Shear Works Co. is consolidating its operation with those of the parent firm, Ohio Forge & Machine Corp., Cleveland. Improved facilities for the design and manufacture of Cleveland Punch & Shear's line of metal forming presses will speed delivery and service, says C. E. Huddleston, executive vice president.

Copperweld Sells Division

Copperweld Steel Co., Pittsburgh, sold its Superior Steel Div. to Superior Steel Corp., a newly formed subsidiary of Fulton Industries Inc., Atlanta. The acquisition includes inventory and Superior's plant and equipment in Carnegie, Pa. Superior Steel produces stainless strip steel, alloys, spring steel, and low carbon specialties.

Metal Smith Organized

James A. Smith has established a new company, Metal Smith, at 406 Parmalee Place, Waukegan, Ill. The firm will represent Wilson Steel & Wire Co., Chicago; Jarl Extrusions Inc., East Rochester, N. Y.; and Libertyville Metal Products, Libertyville, Ill., in sales of their products in Wisconsin.

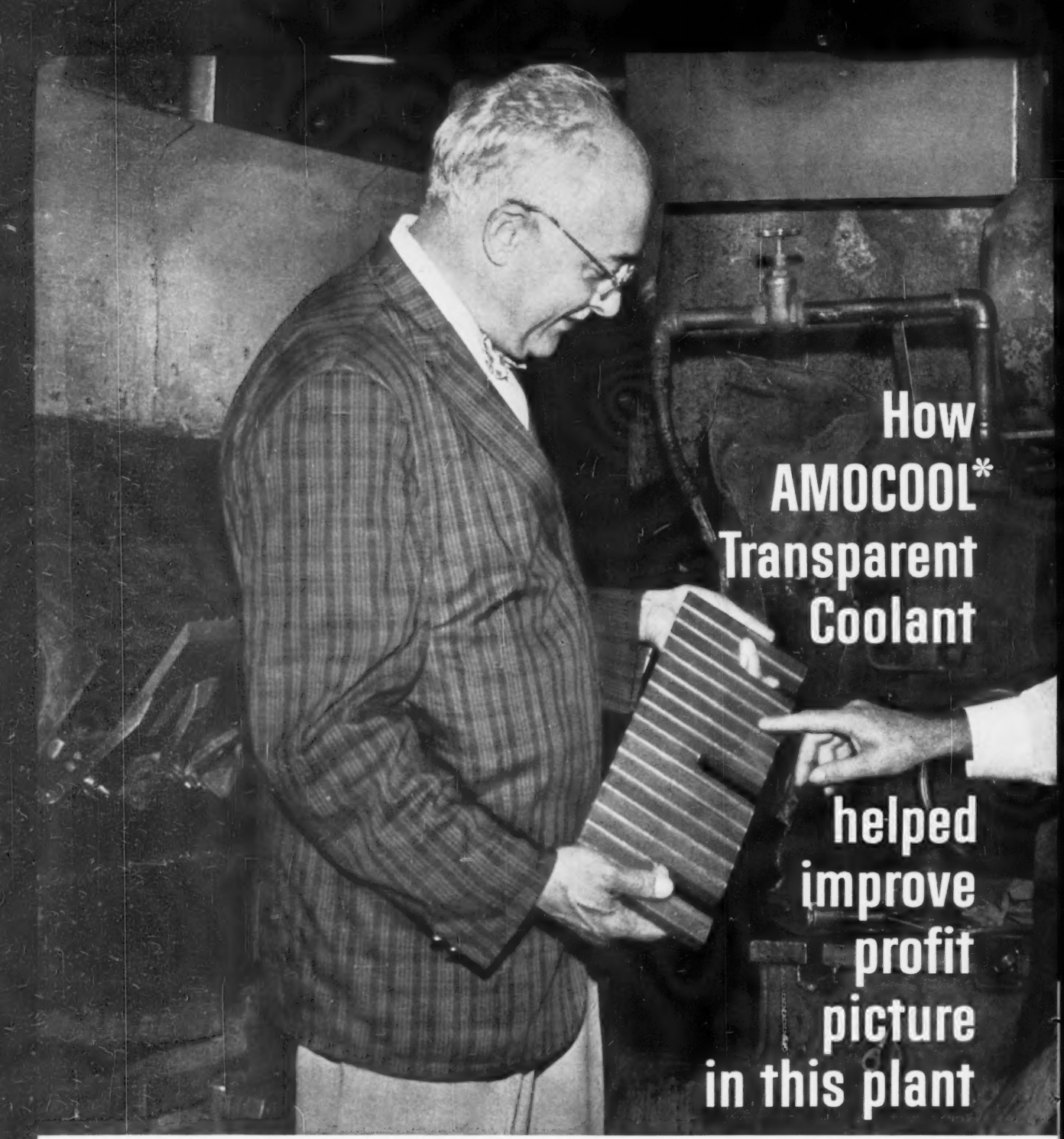
Armco Opens Chilean Unit

Armco Steel Corp., Middletown, Ohio, has formally opened its enlarged, highly mechanized, stainless steel bar and wire warehousing and distribution facility in Baltimore. On Jan. 1, the firm will change the status of Armco Drainage & Metal Products Inc. from a subsidiary to a division, redesignating the operation Metal Products Div.

The $1.8 million, 48,500 sq ft addition to former facilities in Baltimore is designed to increase bar shipping capacity by 50 per cent. The integrated facility is capable of shipping 3000 tons of stainless steel bars per month, says M. B. Wilson, vice president-sales, Armco Div. The heart of the unit is a mobile material handling system linked to an electronic order communication system.

The change from a subsidiary to a division will not affect the Metal Products organization's present role as a manufacturer of pre-engineered steel buildings, corrugated metal drainage structures, foundation piling, and related construction products. W. O. Robertson will continue to head Metal Products Div. in the

(*Please turn to Page* 118)



How AMOCOOL* Transparent Coolant helped improve profit picture in this plant

*Trademark

BY PAUL E. "PAPPY" STRATTON

About the Author. "Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

* * *

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.

Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Plant manager, John Yonker (right) and Sam Vineh, operator, look on.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

* * *

Would you like this kind of technical help to assist you in improving profits? Get it by calling the American Oil Company office nearest you.

Quick facts about
AMOCOOL Transparent Coolant

- Clear, transparent fluid
- Controls corrosion on work and machines
- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Fire resistant
- Odorless

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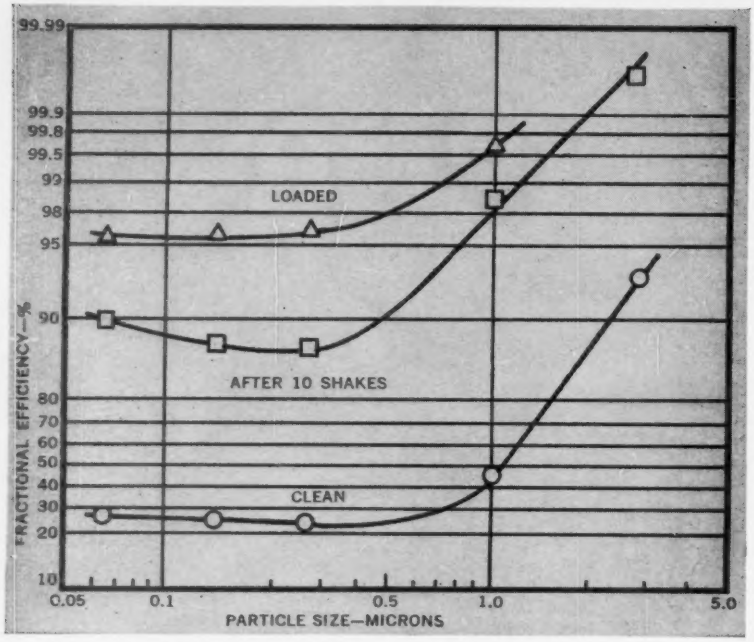
Chicago 80, Illinois

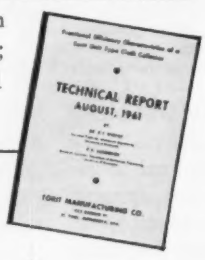


revolutionary "dust-making machine" proves Torit Dust Collectors have

HIGH AIR FILTERING EFFICIENCY

Because of an increase in critical dust collection problems and rising standards in industrial hygiene, need has arisen for more precise measurements of filtering efficiency. In the past, because of inability to produce uniform-size, sub-micron dust particles, filtering efficiency has been measured by weight. However, recently a homogeneous aerosol generator capable of producing uniform sub-micron particles as fine as .05 microns (1/500,000 inch) and as coarse as 15.0 microns, has been developed by Dr. K. T. Whitby, leading authority on particle technology. (Smoke, fumes, and bacteria fall within this range; most industrial dusts are 2 microns or larger.) Tests using such uniform particles indicate fractional efficiency based on particle count . . . the most exacting filter efficiency tests ever devised.

Under this most demanding of all filter tests, Torit Cloth Filter Dust Collectors performed superbly. Fractional efficiency when loaded with fine dust ranged from 96% at 0.1 micron to 99.99% at 2.5 microns; and after shaking 10 times, from 88% at 0.1 microns to 99.93% at 2.5 microns.



For further information, write for Dr. K. T. Whitby's Technical Report on the "Fractional Efficiency Characteristics of a Torit Unit Type Cloth Collector."

TORIT manufacturing company

1133 Rankin Street, St. Paul 16, Minnesota, Dept. 1236

(*Concluded from Page* 115)

position of vice president and general manager.

Logan T. Johnston, Armco president, says the change is the final step in a broad reorganization program started last June. At that time, ten division headquarters, handling manufacturing and sales operations for locations throughout the U. S., were reorganized into three major area organizations and seven area-administered sales regions covering the same portions of the nation as the former units. The reorganization plan was designed to increase efficiency, improve service to customers, and reduce overhead.

Chase Brass Forms Warehouse Sales Unit

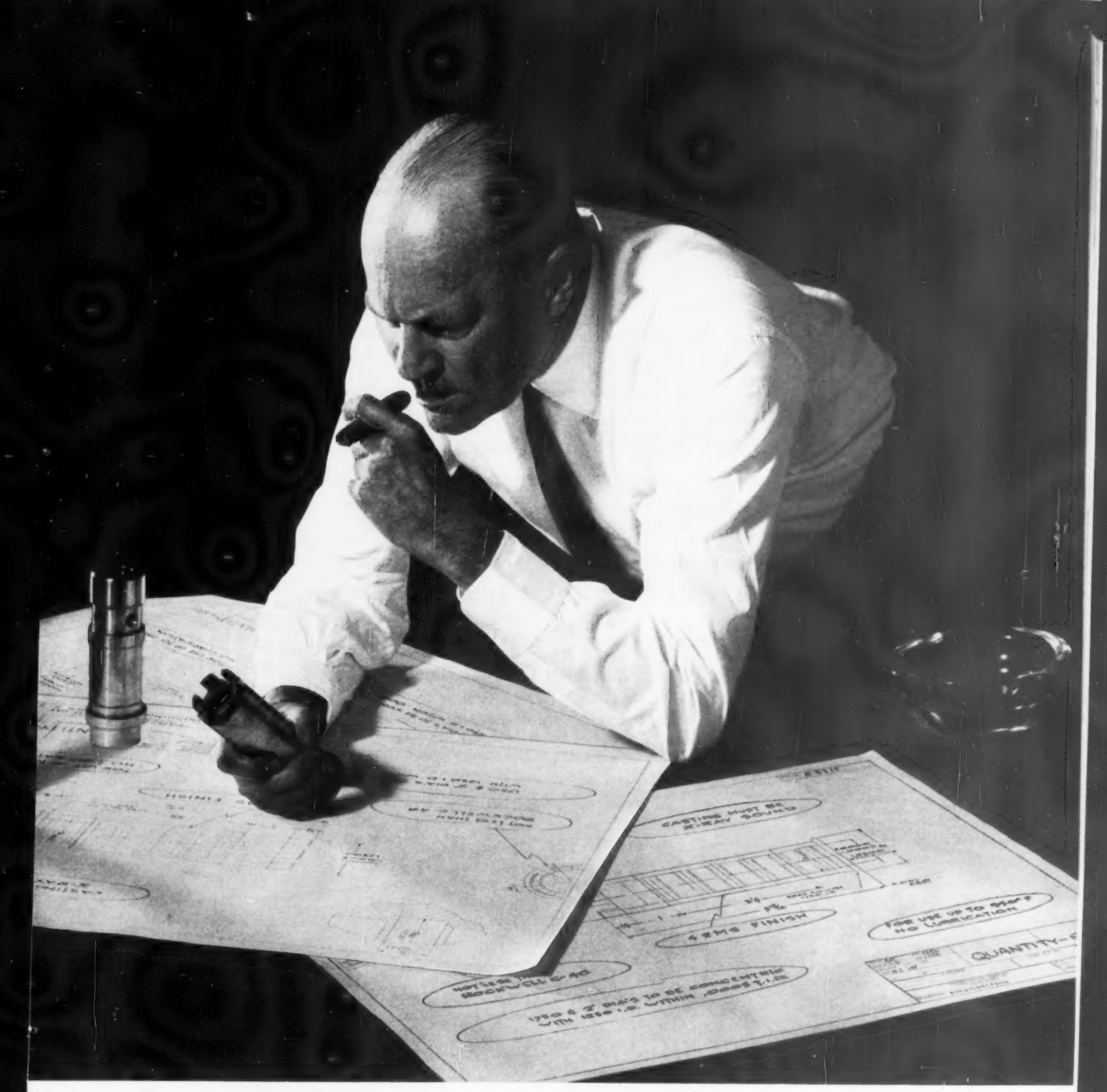
The warehouse system of Chase Brass & Copper Co., Waterbury, Conn., is operating under a new name, Chase Metals Service Div. H. H. Kremer, vice president, heads the new division. Formation of the division with its own independent sales organization "is the newest phase of a long range management program to match new customer needs with new customer services," says G. P. Bakken, president of Chase, a subsidiary of Kennecott Copper Corp., New York.

ASSOCIATIONS

Conveyor Equipment Manufacturers Association, Washington, elected these officers: President, G. H. Woodland, Chain Belt Co., Milwaukee; vice president, E. L. Weinthaler, Conveyor Systems Inc., Morton Grove, Ill.; treasurer, H. E. Murken, Hewitt-Robins Inc., Stamford, Conn.; and secretary, J. B. Spain, Alvey-Ferguson Co., Cincinnati.

R. A. Brackett, Spencer Turbine Co., Hartford, Conn., was elected president of the **Foundry Equipment Manufacturers Association,** Washington.

Investment Casting Institute, Chicago, elected these officers: President, R. E. Gray, Gray-Syracuse Inc., Manlius, N. Y.; and vice presidents, J. H. Cadieux, Casting Engineers Inc., a division of Consoli-



I need a bushing that will last more than a month!

His problem: Metal-to-Metal wear that led to seizing and galling and then . . . quick failure. His remedy? Well, the use of a HAYNES cobalt-base alloy could be the answer.

These alloys have low coefficients of friction and are unusually long lasting under Metal-to-Metal wear conditions . . . ideal for bushings and sleeves. And they can be supplied in the exact shape, to the exact dimensions, and with the type finish needed to do the job.

But HAYNES alloys can do more than solve bushing problems. They are used universally . . . wherever metal parts that must take a beating are required. To help you get acquainted with the characteristics of these alloys, write for our 32 page book.

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ALLOYS

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PLAYING FOR BIG STAKES IN THE CAN MARKET, KAISER ALUMINUM FINDS A . . .

NEW WAY TO CUT, DEAL AND STACK THE DECK

Into aluminum's battle for the can market, Kaiser Aluminum & Chemical Corporation has just introduced a formidable new weapon: a shearing and classifying line that runs as fast as the fastest lines currently used by the steel industry for tinplate. ■ In effect, the new line obsoletes existing aluminum can stock cut-up lines. Operating on light gages of aluminum, these older lines have a top shearing and piling speed of 350 feet per minute. Classifying is a separate operation. The new line, designed and built by Bliss' Rolling Mill Division, shears, classifies and piles in a single, continuous operation at speeds up to 600 feet per minute. ■ Starting with coils of aluminum strip up to 42″ wide and weighing as much as five tons, the Bliss line levels the strip, automatically checks it for variations in thickness, shears it into accurately-sized sheets, and classifies the metal. Down time for coil changing is all but eliminated by a specially-designed coil entry turnstile, which readies a coil for mounting on the entry payoff reel while the preceding coil is paying off into the line. Moreover, there are two "prime" stacks at the delivery end, so that one can be removed while sheets are feeding onto the other. ■ Located at Kaiser Aluminum's Trentwood, Wash., plant, the new classifying line is an outstanding example of how Bliss can engineer equipment for special requirements. For other examples of Bliss installations in the plants of basic metal producers, write us for a complimentary copy of our 84-page Rolling Mill Brochure, Bulletin 40-B.

Bliss is more than a name . . . it's a guarantee

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Rolling Mill Machinery • Heavy Presses • Contract Manufacturing

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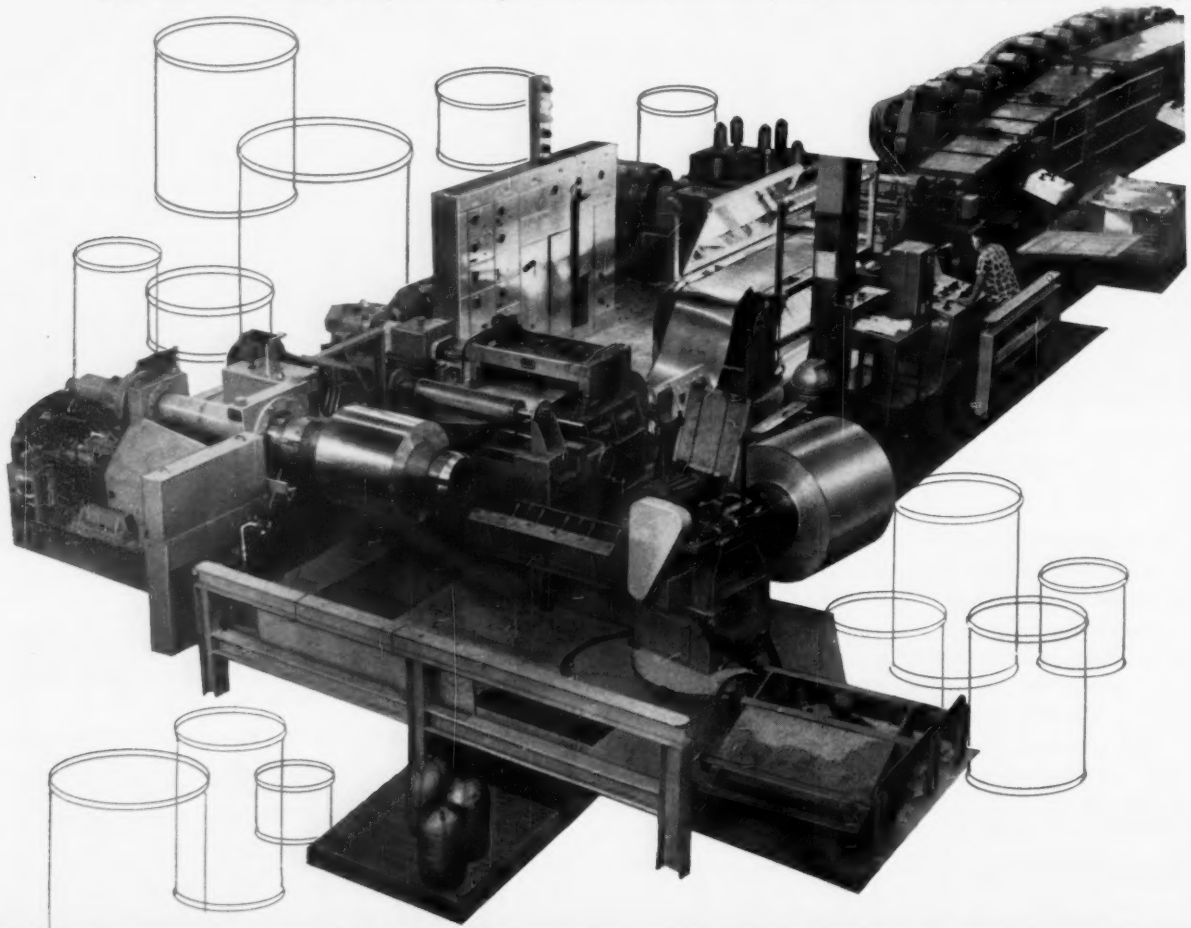

dated Foundries & Mfg. Corp., Chicago; W. A. Dubovick, Engineered Precision Casting Co., Morganville, N. J.; T. C. Nilsen, Nilsen Mfg. Co., Haines City, Fla. H. P. Dolan is executive director.

Metal Treating Institute, Rye, N. Y., elected these officers: President, J. H. Ries, Lakeside Steel Improvement Co. Inc., Cleveland; vice president, L. J. Haga, State Heat Treat Inc., Grand Rapids, Mich.; and treasurer, M. Luntz, Wisconsin Steel Treating & Blasting Co., Milwaukee. H. R. Herington is executive secretary.

Industrial Truck Association, Pittsburgh, elected these officers: President, R. L. Wolter, Automatic Div., Chicago, Yale & Towne Mfg. Co.; vice president, W. L. Utley, Towmotor Corp., Cleveland; and executive secretary - treasurer, L. West Shea.

National Electrical Manufacturers Association, New York, elected these officers: President, H. L. Travis, Kelvinator Div., American Motors Corp., Detroit; vice president, E. R. Perry, National Vulcanized Fibre Co., Wilmington, Del.; and treasurer, A. E. Pringle II, Pringle Electrical Mfg. Co., Philadelphia.

The newly formed **Iron Castings Producers Group**, organized at the recent meeting in Toronto of the **Gray Iron Founders' Society**, Cleveland, elected these officers: President, James Crowley, Pioneer Foundry Co., Jackson, Mich.; vice president, R. W. Jordan, Hamilton Foundry Inc., Hamilton, Ohio; and secretary-treasurer, J. A. Ashby, Ashby & Associates Inc., Cleveland.

Grinding Wheel Institute, Cleveland, elected these officers: President, W. G. Pinkstone, A. P. de Sanno & Son Inc., Phoenixville, Pa.; vice president, C. F. Leitten, Electro Refractories & Abrasive Corp., Buffalo; and chairman, L. A. Patt, Carborundum Co., Niagara Falls, N. Y.

Richard E. Fuller, American Abrasive Co., Westfield, Mass., has been elected chairman of the **Abrasive Grain Association**, Cleveland.

For that BIG or extra RUGGED Door, Kinnear's "Goliath" slat is *unbeatable*

KINNEAR®
ROLLING DOORS
Saving Ways in Doorways

Roll-formed of steel or aluminum* this giant slat forms a curtain of unmatched strength — an almost impenetrable barrier! Ideal for extra large and special openings such as in prisons, piers, gantry cranes — wherever ruggedness and durability count more than the extra cost.

All Kinnear Rolling Door advantages are retained in the "Goliath" slat . . . space-saving, coiling-upward action . . . jamb-to-jamb doorway clearance . . . fast-action push-button control by means of the all-new Kinnear Motor Operator (optional) . . . protection against wind, weather, vandals, intruders . . . valuable resistance to fire . . . an unmatched record for long, low-maintenance service at low cost. Write today for free information.

**14 or 16 U.S. gauge steel; 10 or 12 B and S gauge aluminum. Other Kinnear curtain slats range down to 1¾ width, in various gauges of aluminum, steel or other metals.*

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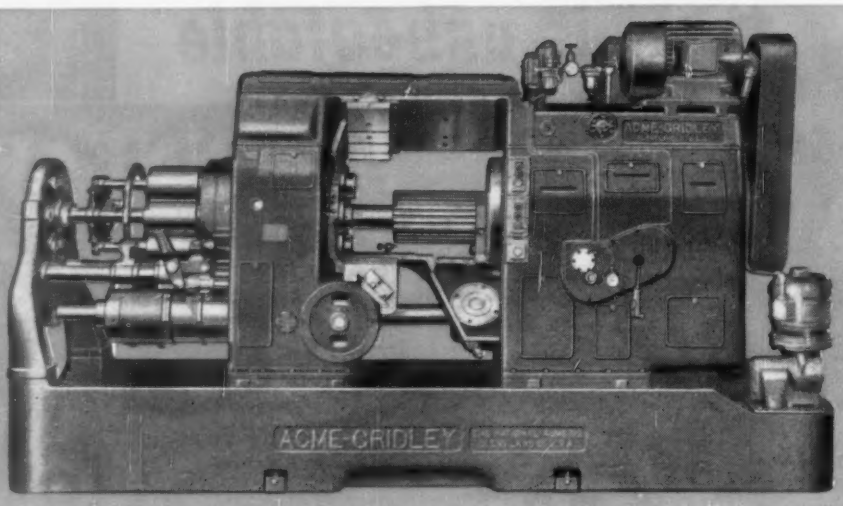
ACME-GRIDLEYS CUT AVERAGE MACHINE TIME 75%

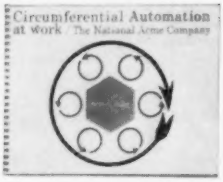
HELP HARDINGE BROTHERS HOLD THE LINE ON END PRODUCT PRICES

"There's no question about it . . . Acme-Gridley Bar Automatics are one of the reasons we haven't raised prices of our precision machines and attachments since 1956! And here's why" explains H. A. Lundy, Vice President of Hardinge Brothers, Inc., Elmira, New York, "when we need over 250 identical precision parts that can be grouped with other parts made from the same size bar, the job automatically goes on an Acme-Gridley. By switching jobs like those shown from conventional turret lathes, we reduce machine time an average 75% including setup time. With this kind of efficiency, it is economical to stockpile parts far beyond our immediate requirements, and take advantage of lower part costs to hold the line on selling price."

As Mr. Lundy says . . . there's no question about it. For short as well as long runs of identical precision parts, Acme-Gridleys are a sure way to cut production costs and increase earnings for years to come. Get in touch. We'd be happy to provide complete details.



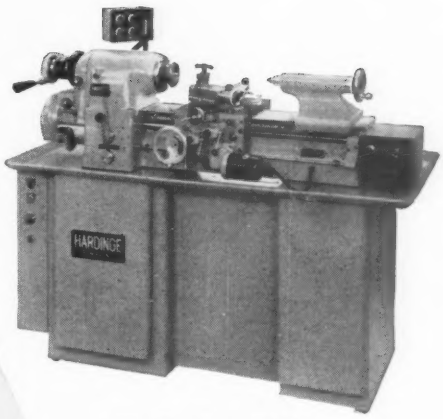
The Acme-Gridley 2" RB-6 Spindle Bar Automatic . . . produced all parts illustrated.



The number of *different* jobs that can be set up on any Acme-Gridley amazes everyone. To give you some idea, we've described some 57 actual jobs in a new 64-page bulletin called "Circumferential Automation at Work". For your free copy, call, write or wire.

HARDINGE PRODUCTION RECORDS ILLUSTRATE ACME-GRIDLEY SHORT RUN EFFICIENCY...

1 8620 Steel Clutch Cam. Run of 500 at 67 seconds per piece... 76.8% machine time reduction over previous method.
2 Rycase Steel Handle for Tailstock. Run of 850 at 59 seconds per piece...76.3% machine time reduction over previous method.
3 Rycase Steel Handle for Nut. Run of 1,100 at 61 seconds per piece . . . 72.2% machine time reduction over previous method.
4 Rycase Steel Spindle Lock Pin. Run of 500 at 59 seconds per piece... 76.3% machine time reduction over previous method.
5 C1117 (leaded) Steel Crank for Screw. Run of 2,000 at 44 seconds per piece . . . 89.2% machine time reduction over previous method. (All machine time reductions include setup time.)



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Valuable "lubricating" effects obtained with thin layer of tin

These two applications illustrate the physical advantage of a thin layer of tin. Both benefit from its low cost lubricating effect.

In the case of the piston, the soft tin is applied by an immersion process. It promotes wear-in without scoring. This lubricating effect guards against the engine break-in damage that was so costly years ago.

In the case of pipe couplings, tin electrodeposited on threads assures tightly sealed joints that do not seize or "freeze." It permits connection to be made or broken with less effort, minimizes high pressure leakage in pipe such as that used in oil country.

Perhaps these examples of the lubricating effects of tin suggest applications to your products. Substantial benefits may be obtained at very low cost.

With over 50 years experience in tin technology, M&T is the leading manufacturer of tin anodes and potassium and sodium stannates for electrotinning and immersion tinning. Ask an M&T engineer for help in adapting the lubricating effects of tin to your products or for information about the complete M&T "package" for tin plating.

M&T **plating products** · welding products
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Technical Outlook

PORTABLE PIPEMAKER—A new pipemaking machine starts with flat coil stock to make welded pipe right in the field. Speed: About a mile an hour. Welds are made by a radio frequency resistance unit manufactured by Tocco Div., Ohio Crankshaft Co., Cleveland. It handles pipe up to 11 in. in diameter with a ¼ in. wall.

TUBE MILL IMPROVED—Automotive exhaust tubing can be made faster and cheaper on a new mill introduced by Yoder Co., Cleveland. It can produce 2 in. tubing from 0.049 in. stock at 35 to 200 fpm, the firm claims, with 25 per cent less power. First unit is being installed at Arvin Industries Inc., Franklin, Ind.

WE'RE AHEAD—The best Russian powerplant couldn't beat any of the top ten in the U. S., insists Babcock & Wilcox Co., New York. Their best, Tscherepetsk Station, reportedly needs 9200 to 9300 Btu to make 1 kilowatt while our best can do it with 8975.

DIMPLING CUTS COSTS—Tanks can be made of a lighter gage metal if dimpled, states Brighton Corp., Cincinnati. The firm makes a light, jacketed, stainless tank for chemicals that replaces one made of heavy gage, stainless plates. Costs can be cut more than 20 per cent, the Ohio firm claims.

URANIUM FUEL PROGRESS—Uranium monocarbide is still favored by some over uranium oxide as a reactor fuel. Ways to process the fuel and hasten the development of sodium cooled reactors, which are said to be more efficient than boiling water types, will be explored under a $1.4 million contract, states Empire State Atomic Development Associates Inc., New York (member firms supply 98 per cent of New York state's power).

DETERMINES CORROSION RATES— A laboratory method which pinpoints corrosion rates of ferrous metals in soils and salt water may also be helpful in determining such rates in strictly underground environments, states the National Bureau of Standards, Washington. The technique relies on cumulative weight loss measurements obtained by polarization. A side benefit: You can measure the effects of weather variations on corrosion.

WIRE REINFORCES PAPER—Paper reinforced with cold drawn wire can be bent easily, yet holds it shape like metal, states American Steel & Wire Div., Cleveland, U. S. Steel Corp. One user: Arkell Safety Bag Co., New York. Other proposed uses: Tarpaulins, snow fences, irrigation piping.

GRAPHITE COMES BIG—Latest graphite forming press at National Carbon Co., a division of Union Carbide Corp., New York, can make shapes up to 200 in. in diameter for missiles. It can also turn out slabs 9 ft by 3 ft thick, 20 ft long for molds.

SEE AROUND CORNERS— Fiber optics enable television cameras equipped with vidicon, cathode ray, or image orthicon tubes to see into odd corners and places by bending light waves, states Radio Corp. of America, New York.

HIGH HEAT ION CHAMBER—Stainless steel has enabled Marquardt Corp., Van Nuys, Calif., to make a high temperature ionization chamber for measuring the neutron flux in nuclear propulsion systems. The device has operated for 500 hours at 1000° F.

CONCRETE BOND—An adhesive (epoxy-polysulfide) will bond concrete to concrete, or metals, plastics, glass, and similar material to old concrete, states Better Finishes & Coatings Co., Clifton, N. J. Bonds are not affected by dampness or freezing, the firm claims.

SOUND CONTROL— A lead bearing plastic sheet that rolls up like a window shade has been developed for controlling noise. Acoustically, such a sheet is comparable to a fixed wall, states the Lead Industries Association, New York.

An operator (at left) is ready to rough bore the clutch contact side of a flywheel housing. A group of new machines (partly shown at right) has been arranged for in-line production of the housings

Machine Team Crops Housing Cost

• A NEW MACHINE layout is expected to bring a 25 per cent cost reduction in machining cast iron, flywheel housings at the Harvey (Ill.) Works of Allis-Chalmers Mfg. Co.

Industrial engineers base their savings estimate on two things: 1. The new machines are more efficient. 2. They have been grouped for straight line production.

The layout includes three, King, vertical turret lathes; an Ex-Cell-O boring machine; and two, Natco, multiple spindle drills.

• Flexibility is a must.

At the Harvey plant, Allis-Chalmers produces diesel and gasoline engines (41 to 350 hp) for construction equipment, farm machinery, lift trucks, and other commercial and industrial applications.

Production runs are small on any one of the 130 different engines made at Harvey. The entire plant is set up for flexible production and quick changeover from one part to another.

In the old plant, parts had to be hand trucked from one operation to the next. Now, parts are moved over a conveyor system which links the new machines. Also, the grouping of the machines allows one operator to run more than one machine.

• Production rating of the new line is 12 finished parts an hour.

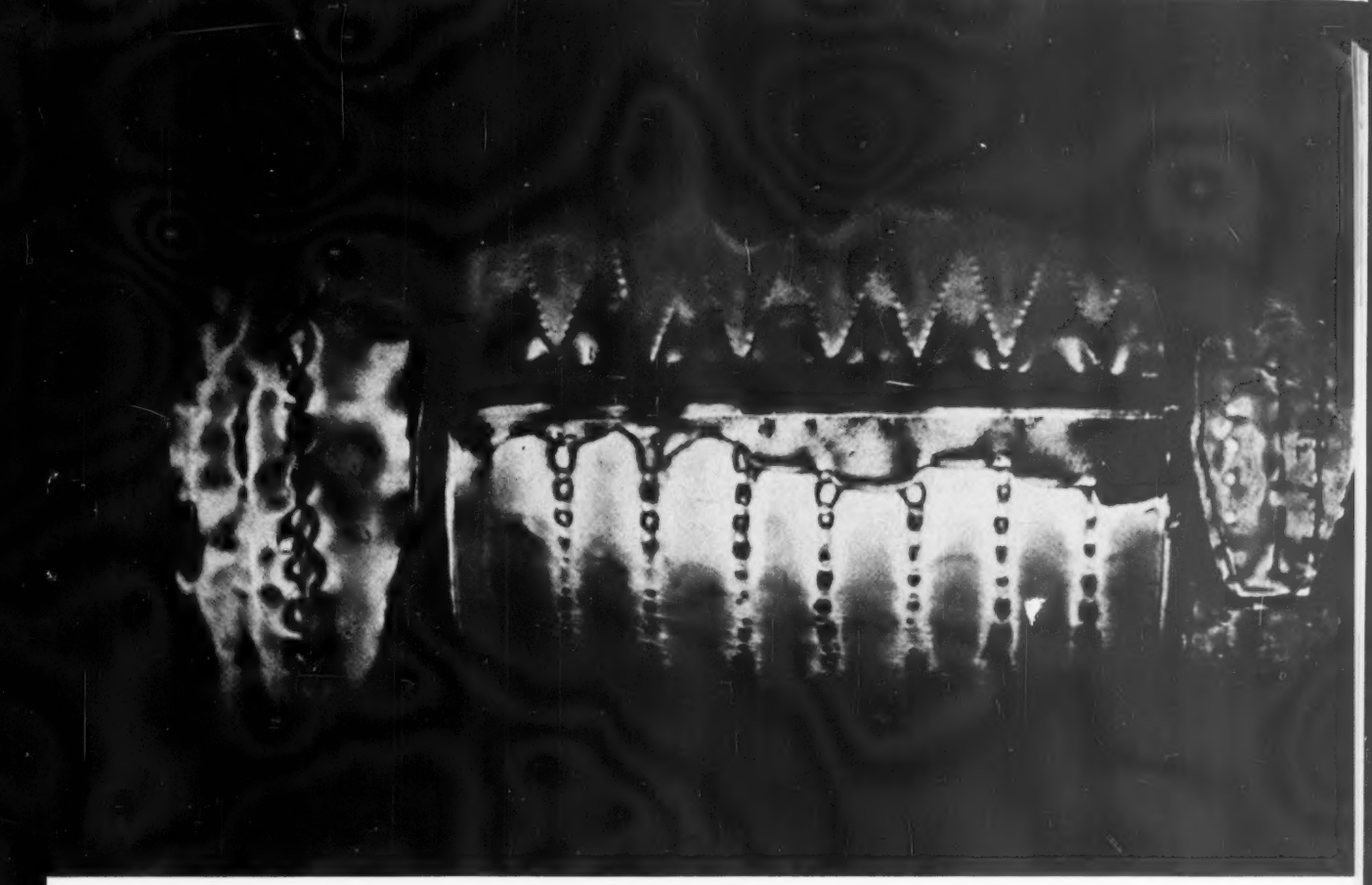
The boring machine, used to rough and finish bore the starter opening on the flywheel housing, has direct reading dials for quick, positive setup. Location of the starter opening in the housings varies considerably, depending on the size of the housing. The boring machine also is used to finish bore the dowel holes which locate the flywheel housing to the engine.

The multiple spindle drills are used to drill the engine mounting holes and the clutch mounting holes in the housing.

A Bullard vertical turret lathe and one of the King VTLs are teamed up to rough and semifinish face and bore the clutch contact side of the housing, and to rough and semifinish bore the engine contact side.

The other two Kings are used to finish face and groove the engine contact side, finish face and bore the clutch diameter, and finish the oil seal bore.

Engineers estimate the King lathes can be changed over from the largest part they will have to machine to the smallest in 30 to 40 minutes.



Color patterns reveal stress distribution on a rocket pressure vessel

STEEL
December 18, 1961

Color Tests Predict Performance

• ENGINEERS are using color patterns like that above to "measure" a product's chances of survival in service. The photoelastic coating helps them analyze design before the part goes into production.

The technique speeded the introduction of a die-cast aluminum block by permitting stress analysis, block redesign, and die changes prior to production (see next page for case history). "It might well have taken us twice as long to get where we are today in developing and designing this block if we had not been able to use this technique," says Ralph Isbrandt, engineering vice president, American Motors Corp., Detroit.

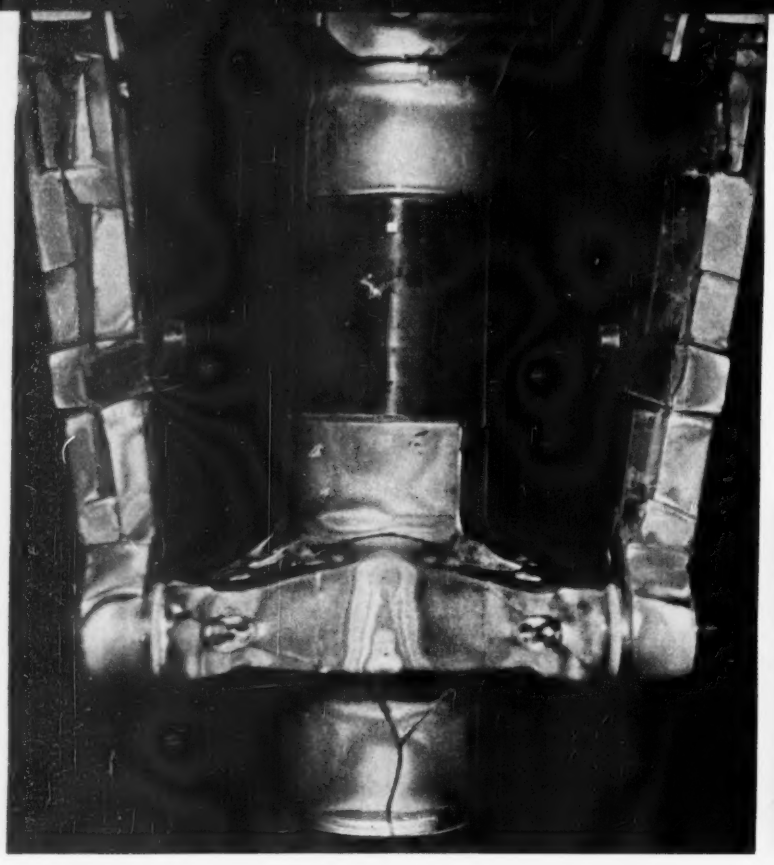
The example illustrates how engineers are finding new ways of using photoelasticity. Much of the work has been done by Dr. Felix Zandman, research director, Instruments Div., Budd Co., in Phoenixville, Pa. He says that more than 60 companies are using the technique as a standard design tool; more than 600 use it for occasional studies.

• The technique permits analysis of the part under operating conditions.

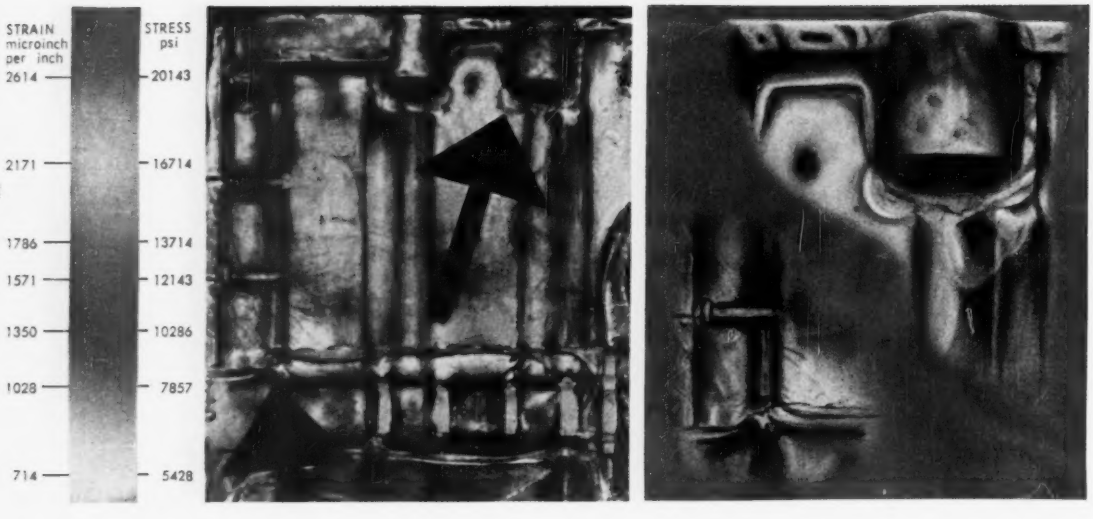
The conventional method involves building a model of the part or assembly from transparent plastic, then determining the stresses in the model under simulated loads. The information gained can be extremely helpful to designers, but the model building step has precluded its use on many jobs.

A much more widely used technique: A brittle lacquer is applied to the working part that's undergoing test. The advantage: Measurements are made on the part itself, rather than a model. The disadvantage: Once the film cracks, the test is over. Useful measurements are no longer possible.

A third, and newer, technique (Budd calls its method PhotoStress) combines the advantages of both. As with a plastic model, the test can be repeated a number of times, and the results can be measured under differing combinations of operating conditions. And as with the lacquer coating



LANDING GEAR for B-58 Hustler is checked for stress patterns under a variety of loading conditions, including spin-up, taxi, take-off, and landing. Work is being done at General Dynamics/Ft. Worth (Tex.). Analysis led to changes that boosted reliability



How Color Helped in Design Of Engine Block

American Motors Corp., Detroit, and Doehler-Jarvis Div., Toledo, Ohio, of National Lead Co., used the photoelectric technique to find danger spots and to make 23 design changes. All the work was completed before the block went into mass production, resulting in substantial savings both in troubleshooting and in the replacement of bad blocks.

Using the calibrated color bar, at left, engineers can "read" the strains shown by the coating of birefringent plastic (it splits light) on the surface of a diecast aluminum engine block. Heavy strains around the bolt bosses, at top, are caused by the normal tightening of the head bolts to 50 ft-lb torque. The strains are in excess of the 10,000 psi upper limit.

Artist's closeup of trouble spots in block (right) shows the

approach, the measurements can be made on the working parts, so no extrapolations between the model and the part need to be made.

The PhotoStress coating can be checked repeatedly as changes occur, or as it's subjected to various types of loads. Engineers at Doehler-Jarvis Div., Toledo, Ohio, National Lead Co. report that two-year-old coatings show no changes in stability or sensitivity. Humidity does not affect the coatings, so they can be put on parts and structures in use.

Since the plastic covers the entire surface of the part (and since gage length is virtually zero), it acts like an infinite number of point strain gages. It will also reveal cracks in a structure.

Dr. Zandman says that with present instrumentation the technique can be used to measure strain within 10 microinches per inch (or stress within 100 psi in aluminum) over the entire surface of all types of ferrous and nonferrous materials. Strain directions are obtainable within 2 degrees of accuracy. Visual comparisons without the aid of meters can be made to plus or minus 150 microinches per inch.

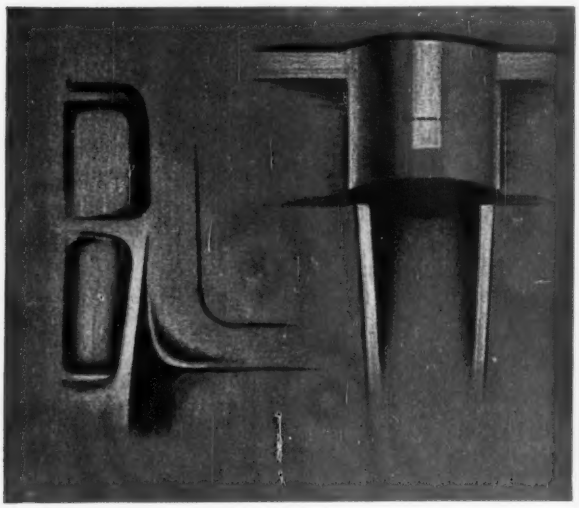
The process can be applied to castings, forgings, extrusions, stampings, machines, and fabricated parts.

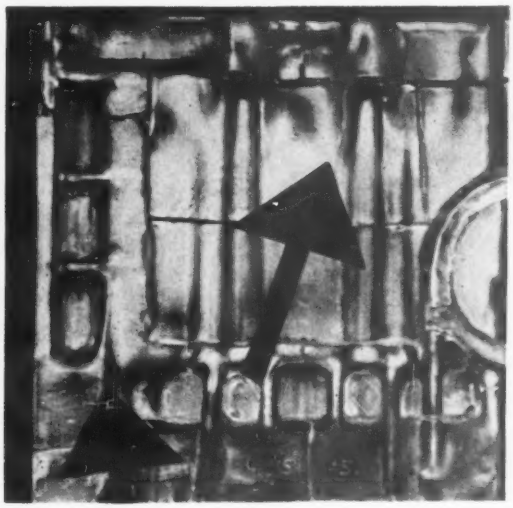
It has been used to measure the torque strains of continuously rotating shafts and to study the effects of explosions, vibrations, and engine thermal stresses. Boston University used the method to analyze stress distribution patterns that formed within a single crystal of aluminum.

Herbert N. Maier, Doehler's chief physicist, feels a key advantage is that you can take moving pictures of parts under operating conditions, then study them over and over again to see what happens when dynamic loads change. "You don't have to be an expert stress analyst to understand what's happening when you can watch these changes take place . . . you can find your errors and correct them without doing a lot of testing," he explains.

• The chief benefit of the technique is the time factor, says American Motors Corp.

In 1959, Mr. Isbrandt relates, the firm adopted four new basic ideas for its engine: A drop center crankcase, the use of hydraulic valve lifters, a new water jacket cover plate, and the elimination of drilling for oil passages. Work started on the revised engine block with introduction to the public less than a year away. AMC and its supplier, Doehler-Jarvis, had to work fast. For weight and cost reasons, they wanted to design as close as possible to maximum stress limits. But with a new design, a new material, and a different processing method (diecasting) they weren't sure just what the stresses would be when the engines were running. Mr. Maier convinced all concerned that Photo-Stress analysis would be the quickest way to determine operating stresses, so changes could be





color warning around the bolt bosses. It also shows the tiny spot on a sharp corner (at lower left of the first photo) where test blocks cracked when initial stresses exceeded 12,000 psi. With the color technique, engineers could anticipate operating problems and design around them before production got underway.

Engineers redesigned block (above) to get rid of critical stress areas. Wide fillets were added at the top of the head bolt bosses, and the use of longer bolts with more thread helped redistribute the stress by pushing the holding action of the bolts farther down the block. Also, a fillet was added where the sharp corner had caused failures.

After redesign and die alterations, a photoelastic coating check (above) shows engineers got what they were after. Stresses at the bolt bosses are no longer dangerous, and the color spot in the corner is gone. Herbert N. Maier, Doehler's chief physicist, says: "During another examination, we found that some areas had no stress concentrations. We proved we could eliminate weight without adding critical stresses. It saved us about 5 lb of metal per block."

The Principle Behind the Process

CERTAIN TRANSPARENT materials, like quartz, mica, and some strained plastics, have the peculiar property of being able to split a ray of light into two beams which travel through the material at slightly different speeds.

The difference in speed is proportional to the difference in strains set up in the material. Coatings of plastic with these double refractory properties are "glued" to the surface of the part. When the part is placed under load, it deforms and the plastic follows the surface strains.

When polarized white light is reflected from the part and viewed through a polariscope, the strain distribution and stress concentrations show up as a pattern of colored and black lines or fringes. Uniform strains show uniform color. The color hue in each area indicates how much strain the part is under. Stress can be calculated from strain. Black lines show the direction of principal stresses.

Budd Co.'s Dr. Felix Zandman (left), one of the pioneers in photoelastic analysis, obtained practical results in France in 1953. He came to the U. S. in 1956.

made as the dies were being completed.

Reports Mr. Maier: "Design modifications were found to be necessary in the cylinder head mounting boss areas to remove stress concentrations which developed when the head was bolted to the block. Whenever it was indicated that a small section needed redesign, we found it practical to make the required change in the die. As soon as the new castings were made, we applied the plastic to only that section, restressed it so we could see immediately whether we got what we were after.

"In one case where assembly loads had developed high stress concentrations on one of the ribs, we milled off the rib while observing what happened during machining. We could watch the stresses change as the metal was removed."

• The coating of plastic is applied in thicknesses of 0.040 to 0.120 in. Modulus of elasticity ranges from 300,000 to 450,000 psi.

The coating costs about $30 a pint—enough to coat 600 sq in., with a thickness of 0.040 in.

The basic equipment, says Dr. Zandman, costs about $4000. You'll need one of several types of polariscopes through which you can view and measure the stress patterns. The scopes generally include a polarized white light source.

Various types of photoelectric meters are available for extremely accurate measurements. Other accessories include monochromatic light sources for black and white photography, torque meters, strobe lights, telescopes, and mounts for movie or still cameras, or for remote TV monitors.

Liquid plastic should be used for small parts, fillets, recesses with small radiuses, and for some studies of plastic deformations. It's also used to mold contoured sheets for curved surfaces. (That's how it's usually applied, although flat plastic sheets are available for broad, flat surfaces.)

• The PhotoStress method won't work on parts that are inaccessible to light or materials which wont accept the plastic bonding, like some thermoplastics.

Care must be taken to get good contoured fits between the plastic and the part. Otherwise, the plastic can deform differently from the part and may not accurately reflect the strain on the part.

The method can't be used for thermal analysis where maximum temperatures rise above 350° F during testing periods of several days, and it won't work for thermal tests where the structure is exposed to 500° F temperatures for more than 30 minutes.

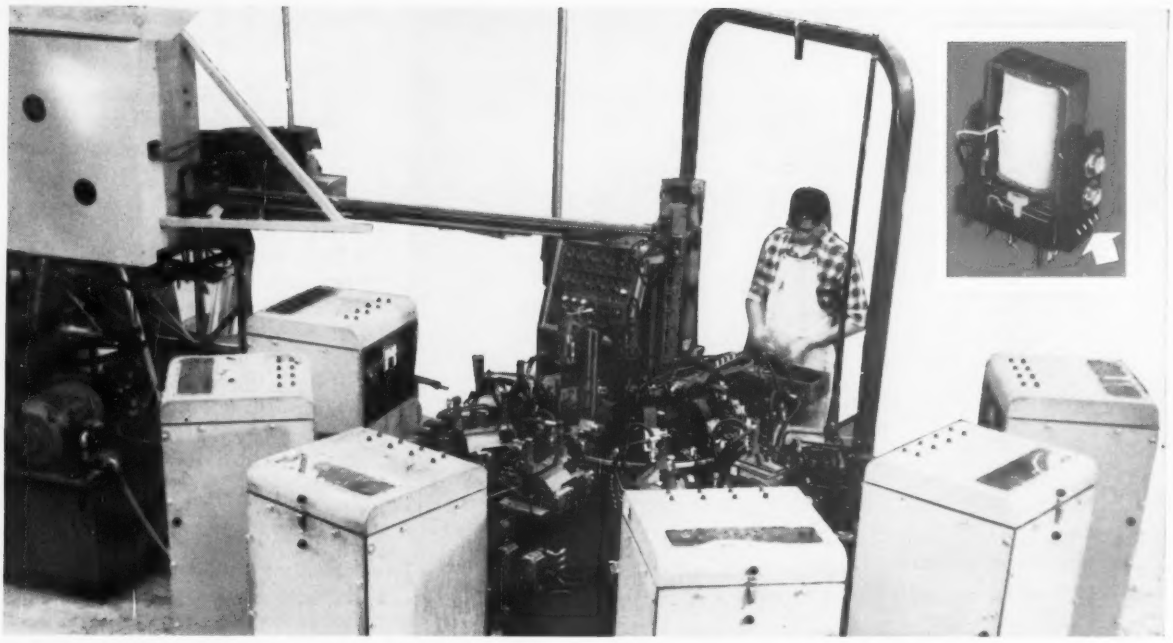
When thin sections (0.10 in. or less) are being flexed, the plastic coating acts as a reinforcement, so correction factors must be used to "read" strain and stress.

Mr. Isbrandt concludes: "We think enough of the process that we've purchased our own equipment. I think we'll be able to use it for testing axles, transmission housings, and other structural parts. It's faster than most other analysis methods. And in the long run, we think it's far cheaper."

So far, the biggest users are manufacturers of aircraft, missile, and atomic energy equipment.

But, commercial applications are on the increase.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



Fine wires must be inserted into thousands of relays daily. The relay shown (inset) has a four contact configuration. The rotary machine is surrounded by six wire feeding boxes. In the rear, the conveyor carries relays from the loading station to the table. The operator's console is behind the rotary machine

Rotary Machine Boosts Production Fivefold

• PRODUCTION of relays for IBM equipment has been increased 400 per cent at International Business Machines Corp.'s General Products Div., Burlington, Vt., since installation of an automatic, rotary machine that forms and inserts 0.016 in. contact wires.

The machine, called Rotosert, was designed by IBM. It can handle relays with 4, 6, and 12 position contacts. The relays are used in accounting, unit record, and computer equipment.

The Rotosert, about 14 ft in diameter, utilizes both electric and hydraulic mechanisms. (When wires were inserted manually, workers often bruised their fingers.) The equipment is essentially a round indexing table which carries each relay to successive work stations on its periphery. Relays are automatically fed from an adjoining loading cabinet via elevated conveyors and a vertical feed column to the table load station. Other cabinets (arranged in a circle somewhat closer to the table) house spools of silver wire and the electrically driven, wire feed mechanisms.

• Special care is maintained in the transfer of relays to avoid damage.

The vertical feed column is designed with spring loaded retainers to hold each relay until pressure is applied to the top of the ram by the overhead cylinder. Each relay is moved down the 18 in. column in 2 in. steps by dogs on both sides of the moving ram.

A hydraulic arm moves relays from the overhead conveyor to the feed column under the ram. In turn, the offset conveyor-to-column arrangement prevents more than one relay being placed within range of the descending ram.

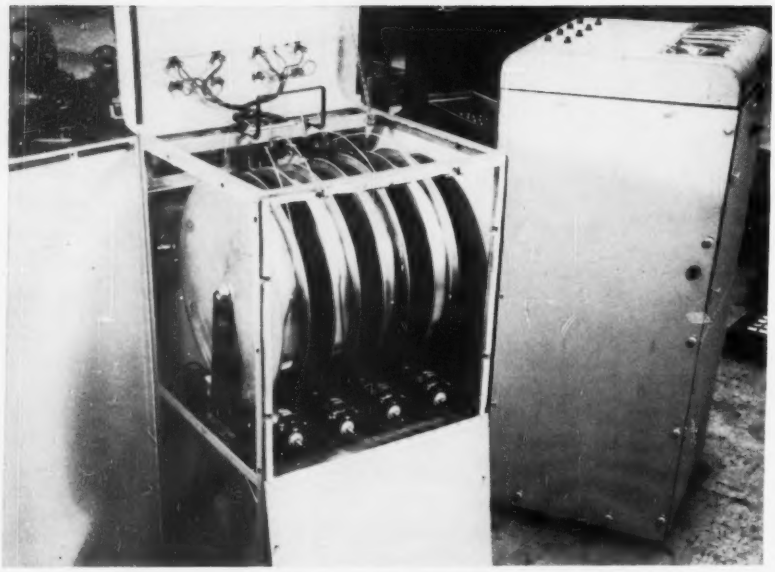
• As a relay leaves the column, it enters a nest recessed in the table.

As the table indexes, the relay is locked into the nest and held rigidly until it completes the trip and arrives at the unload station.

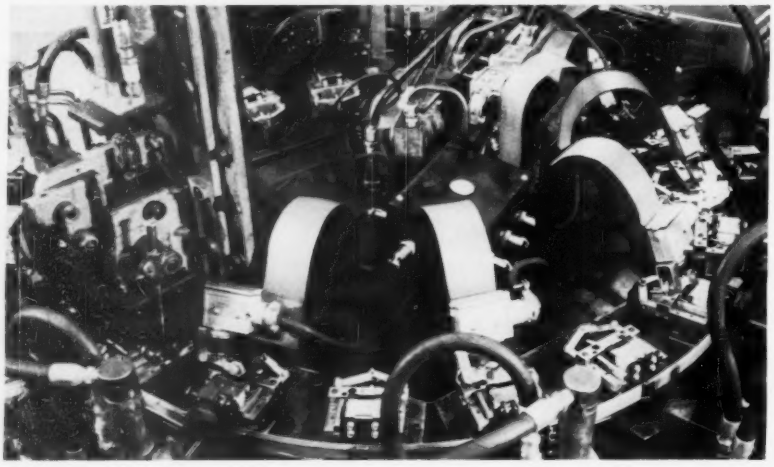
At the first work station, the plastic tension plate on the relay is aligned with the wire window. A wrench device opens the screw holding the tension plate as pins enter the wire window and align the plate. With the pins in position, the wrench reloads the screw and both wrench and pins retract.

At the next station, steel probes check wire path for obstructions. Any obstruction will cause the machine to stop, permitting the faulty relay to be removed manually. Probes must complete the travel in both directions before the table will index.

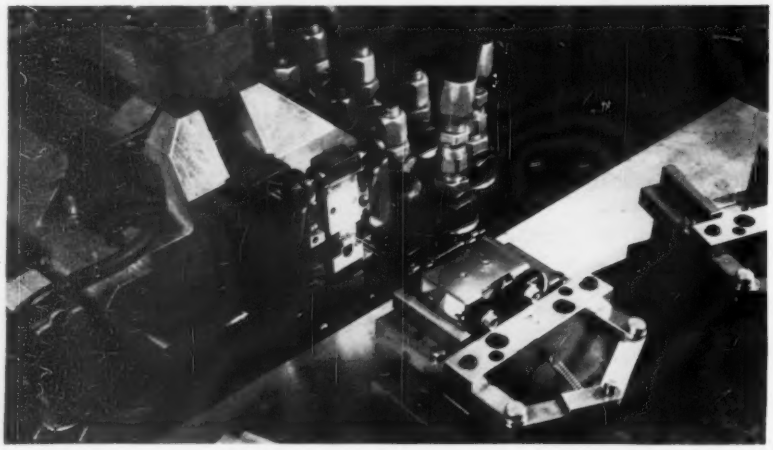
Following are six stations. Two,



Each wire feeding box holds four reels of wire for forming contacts



Closeup of rotary machine: Sensing elements (held by the curved steel bands) check each relay nest to prevent the station from operating and jamming on empty nests



With needles retracted, wires are fed from the wire station head into the relay

three, or all will be used, depending on whether the relays in process are 4, 6, or 12 position units. Each station will load wires in two positions, but since each position requires two wires side by side, each station is actually inserting four wires.

• Each insertion station takes wire from a large diameter spool, through a payout frame, feeds the wire two-thirds of the way into the relay, cuts off the wire to length, and forms the end of it.

Insertion of the wires is intricate because of the small openings through which it must pass later. No lubrication can be used and wires cannot be allowed to bend and pick up a permanent set.

Five hydraulic cylinders at the insertion station move the tools that guide, hold, insert, cut off, and form the wires. As the relay reaches this station, hollow tubes are run up to each of two windows. Forward clamps seize the wire and carry it in through the tube guides to the relay. Rear clamps then grip the wire allowing forward clamps and guide tube to retract without carrying the wires back. When the guides have retracted, jaws above and below the wires close, the wires are cut from the spool supply and bent.

One-third the length of each wire remains extended as the table indexes carrying the relay from the insertion stations.

• After passing through the insertion stations, the relay is fed to a station where the tension plate is reset to a position to exert a slight pressure on the wires.

The lower screw is loosened by a wrench and a ram pushes the tension plate up to a predetermined height. The lower screw is then tightened.

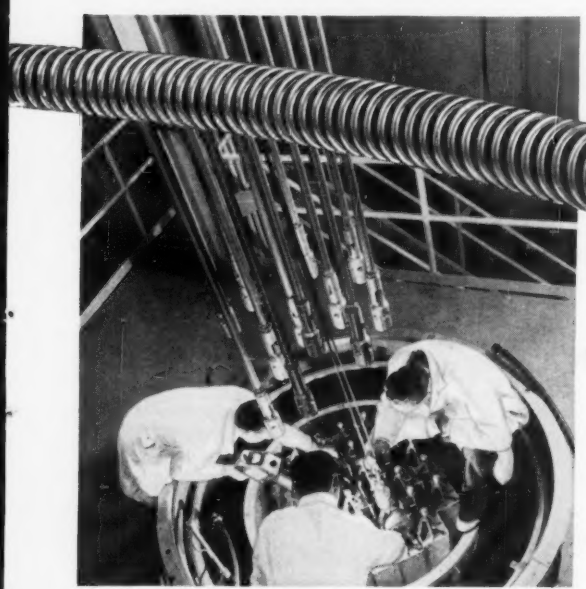
At the next station, the relay is unloaded from the table after wires are simultaneously pushed home in the relay. The ends of the wires pass into gaps which form the contact points of the switches. A horizontal ram pushes the wires to their final locations. Then the nest is unlocked and a ram pushes up from below, carrying the relay to an exit chute from which it is transferred to a test area.

"Scram" Springs Halt Nuclear Hazards

Whether installed in a ship for propulsion, or on land for electric-power generation, a nuclear reactor running wild is highly dangerous. In case of malfunction or overload, neutron-absorbing rods must be driven fast into the nuclear pile to halt fission.

For emergency scramming or driving the rods, the mechanical system utilizing coil springs offers a high degree of safety, reliability, and performance. The springs are under constant load while the reactor is operating, and stability under load is mandatory. They must retain their strength at high stress levels and show minimum load loss at temperatures beyond even 500°F. The material must be highly corrosion resistant and relatively unaffected by radiation.

Meeting exacting precision and performance requirements is no novelty for A.S.C. springmakers. From nuclear applications to automobiles and home appliances, A.S.C. Divisions offer engineering, mechanical and metallurgical resources unequalled in the spring industry. If such broad experience can be of benefit in your present or future developments, call in an A.S.C. Division.



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"Scram" springs act in emergency conditions to drive neutron-absorbing rods into the nuclear pile to halt fission.

Tight specifications and controls govern the "scram" spring from wire to finished product. During each stage of manufacture, tolerances are carefully checked by precision instruments.

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Raymond Manufacturing Division, Corry, Penna.
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Ohio Division, Dayton, Ohio
B-G-R Division, Plymouth and Ann Arbor, Mich.
Gibson Division, Mattoon, Ill.
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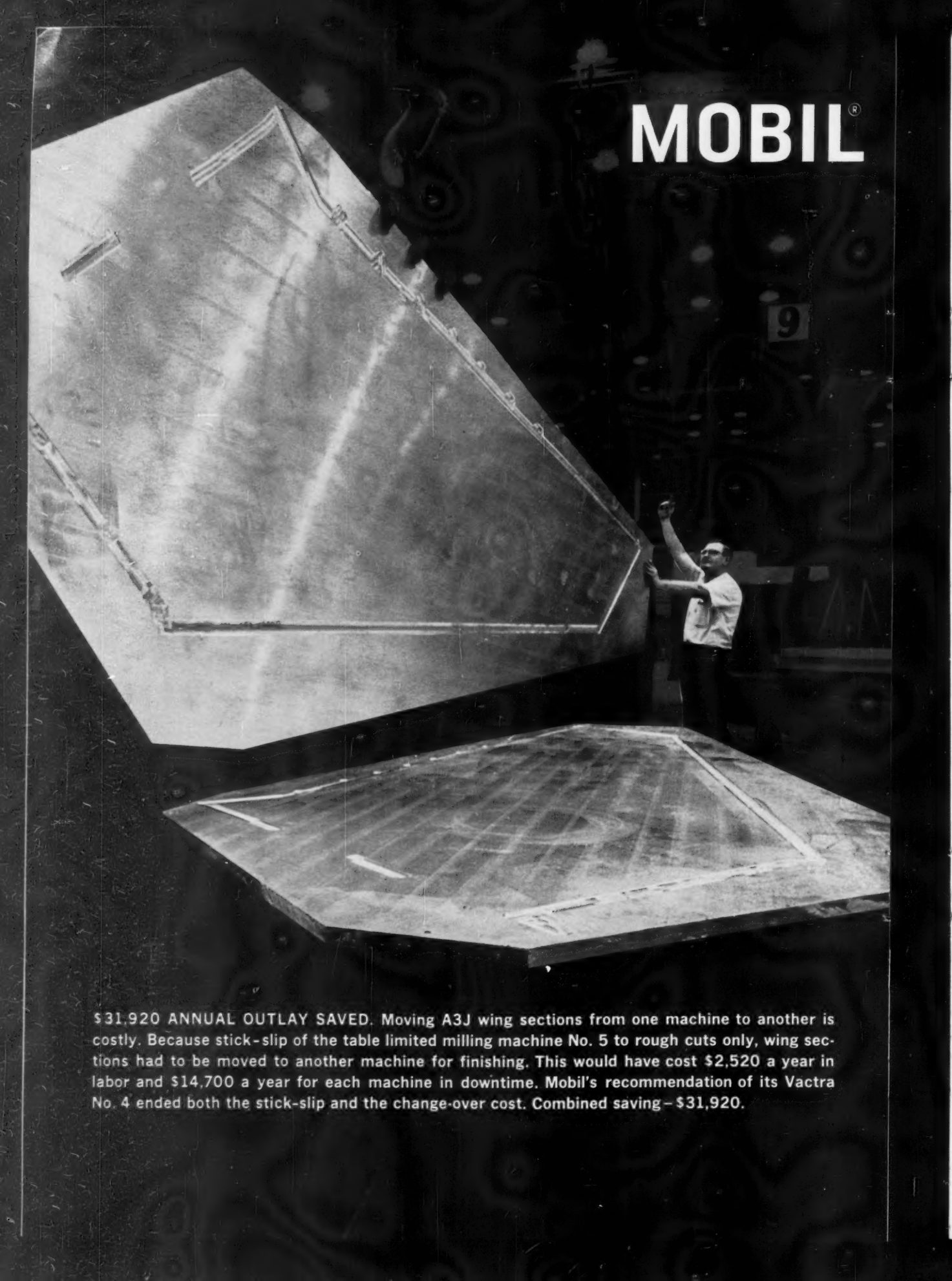


$31,920 ANNUAL OUTLAY SAVED. Moving A3J wing sections from one machine to another is costly. Because stick-slip of the table limited milling machine No. 5 to rough cuts only, wing sections had to be moved to another machine for finishing. This would have cost $2,520 a year in labor and $14,700 a year for each machine in downtime. Mobil's recommendation of its Vactra No. 4 ended both the stick-slip and the change-over cost. Combined saving – $31,920.

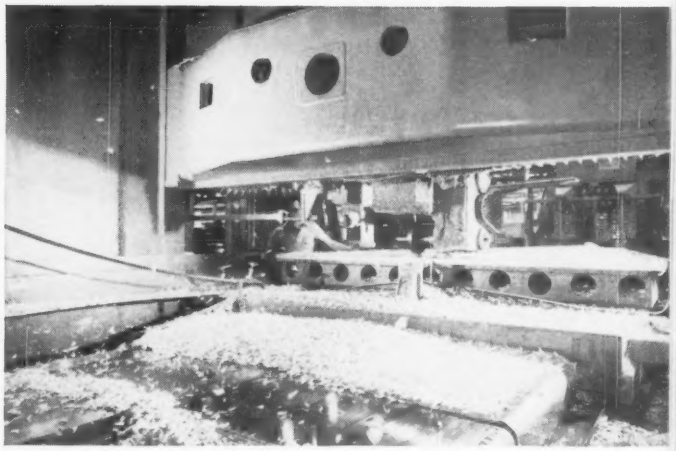
effects a projected $38,620 saving at North American Aviation

Mobil recommendation reduces cost of milling A3J Vigilante wing sections by eliminating stick-slip problem ...avoiding machine repair cost and reducing work handling.

The job: Skin milling aluminum alloy wing sections for Navy A3J Vigilante attack planes; designed, engineered and built by North American Aviation's Columbus (Ohio) Division—one of the nation's major defense facilities. Skin mills reduce thick aluminum alloy slabs to less than half their original thickness, leaving only structural ridges at original height. Finished contoured wing section becomes part of a "wet wing" designed to contain fuel.

The problem: Excessive stick-slip due to poor way lubrication made one mill too inaccurate for finishing cuts. Work had to be moved to another machine for finishing. Attempts to improve the situation by machine adjustment were unsuccessful.

The solution: Mobil introduced and recommended an improved Vactra® No. 4—a lubricating oil designed especially to meet the critical requirements of lubrication between plastic and cast iron ways. It completely eliminated the stick-slip problem. Now both rough and finish cuts can be made on the same machine, saving work handling and labor costs projected at $31,920 annually. A previous plan to remove the 40-foot table and rescrape the ways became unnecessary, avoiding a repair cost of $6,700. Total savings—$38,620.



$6,700 saved by eliminating scheduled 8-day repair job. Normally running six 24-hour days a week, each of NAA's skin mills has a production value of $800 a day. Eight days' downtime for repair on Mill No. 5 would have represented a loss of $6,400. Adding $300 in repair labor would have brought the total cost to $6,700, avoided by Mobil's lubrication recommendation.

VACTRA® NOS. 1-4

Meet All 6 Requirements for Effective Way Lubrication:

1. **Minimum stick-slip for greater accuracy**
2. **Controlled "table float" for precision operation**
3. **Unsurpassed protection against way scoring**
4. **Prevention of filter clogging**
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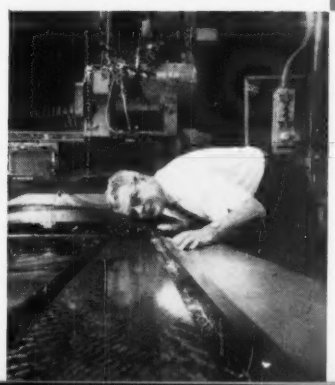
6. **Effective lubrication under simple re-use conditions**



H. M. Lamb, Mobil Representative, inspects bed ways of one of North American's many skin mills. All ways are now protected with Vactra No. 4.

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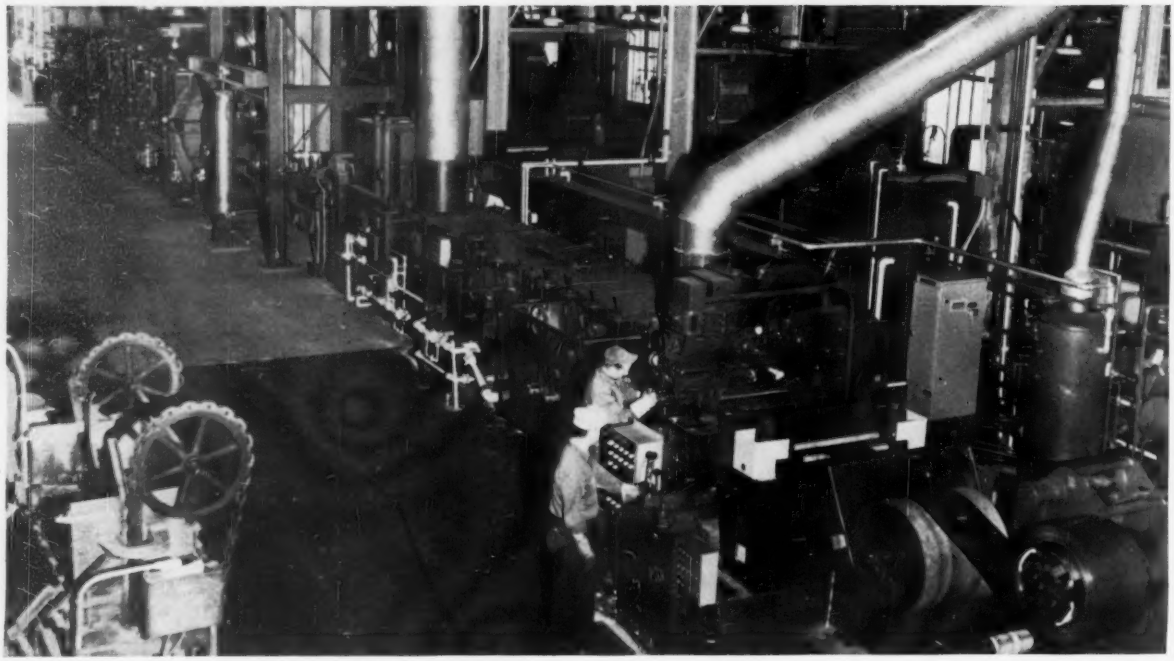

Continuous process removes residue left by annealing . . .

Cleaner Stainless Insured By Aqueous Brush Washing

• CLEANLINESS of bright annealed, stainless steel strip has been improved by a washing system at Superior Steel Div., Carnegie, Pa., of Copperweld Steel Co. It combines the benefits of an aqueous cleaning solution with the mechanical action of rotating, nylon brushes.

Equipment and methods developed by Pennsalt Chemicals Corp., Philadelphia, are said to remove oils and abrasives from previous processes and to provide a good luster, without haze or surface scratches (the nylon prevents scratching).

Success of the system has prompted several other stainless producers to install similar equipment.

• Besides providing a top quality product, the system is said to reduce over-all processing cost.

Optimum cleaning results, says Superior, are insured by the "system" approach to strip cleaning in an annealing application that calls for absolute visual cleanliness.

More effective smut removal, made possible by mechanical action of the brushes, and elimination of surface residues have resulted in significant quality improvements. The alkali cleaning compounds are regarded as safe for use on critical, bright annealed surfaces.

Strip and brushes are sprayed with cleaning solution, then the strip is wiped clean with a squeegee and given a brush rinse. Cleaning is completed by a steam flood, which also provides supplementary heat for drying. (Most of the drying heat is supplied by gas burners.)

Automatic, dry feeders add alkali to the solution as needed. The feeders are actuated by changes in electrical conductivity of the solution.

Controlled foam type cleaners are used in the process, and provisions are made to control sedimentation. The system includes two separate cleaning stages. One can be drained and refilled—at intervals of one to four weeks—without shutting down the line. Solution is pumped to the brushes as well as the strip to help prevent buildup of solids.

Inexpensive chemicals and high production rates make the process economical. Initial investment for the washer is slightly higher than for some other systems, but Superior says that extra cost can be written off in less than a year.

• The system was perfected for stainless steel sheets, adapted to strip processing.

Production men at Superior got help from Pennsalt engineers in developing an aqueous brush washing system that would work satisfactorily in a continuous operation.

Superior's interest in aqueous brush washing came as a result of successful application to plate and sheet polishing.

Pittsburgh Metal Polishing Co. conducted a three year development program with Pennsalt to perfect the process.

METALGRAMS

. . . news of "Electromet" ferroalloys and metals

UNION CARBIDE METALS

DECEMBER 1961

REDUCED INVENTORIES CUT COSTS -- Fast delivery of ferroalloys from one of Union Carbide Metals' 39 distribution centers allows metal producers to reduce inventory costs. Why? Large ferroalloy inventories are no longer needed. Purchases can be made to meet current ferroalloy needs. UCM has a plant or warehouse in every major metal-producing area in the country. Thus, delivery to your plant has been reduced from days to hours.

* * *

IMPROVED PACKAGING AND HANDLING, TOO -- Union Carbide Metals has also reduced customer handling costs by developing better packaging and material-handling methods. UCM introduced dump trucks for bulk deliveries of alloys. It has long used railroad container cars. Special shipping and unloading techniques have often been developed to meet a customer's particular conditions. UCM also played a leading role in the development of pre-formed alloys such as bricks, briquets, and pigs, and pre-weighed packages such as bags, cans, drums, and box pallets. For more information on distribution centers and alloy shipments, write for the article, "More Efficient Ferroalloy Distribution," in the Fall 1961 issue of UNION CARBIDE METALS REVIEW

* * *

ARC OR INDUCTION -- WHICH IS BEST? -- In just a few years, vacuum-induction and vacuum-arc melting have grown from laboratory curiosities to important commercial processes. In fact, today they account for 280 million lb. of annual capacity in the United States. Although both are designed to produce ultra-pure metals and alloys, they are not strictly competitive. Vacuum-induction melting is the best method of making metals where tight control of chemical analysis is required. Vacuum-arc melting improves purity and uniformity by effectively removing gases and inclusions. For more information, write for the article, "Which Vacuum Process to Use?," in the Fall 1961 issue of UNION CARBIDE METALS REVIEW

* * *

SELECT AN ALLOY -- Are you looking for a low-cost charge chrome alloy that will best fit your stainless steel melting conditions? Or an exothermic chromium or manganese that can be used for large open-hearth ladle additions? Or pure metals such as chromium, manganese, silicon, columbium, tantalum, and vanadium? You can find the answers in the new "Electromet" Ferroalloys and Metals Selector that contains a complete list of alloys for steel, iron, and nonferrous metals. It lists the composition and suggested use of each alloy...so you can select the one you need. For a copy, write for F-20,119

* * *

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270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Ltd., Toronto.

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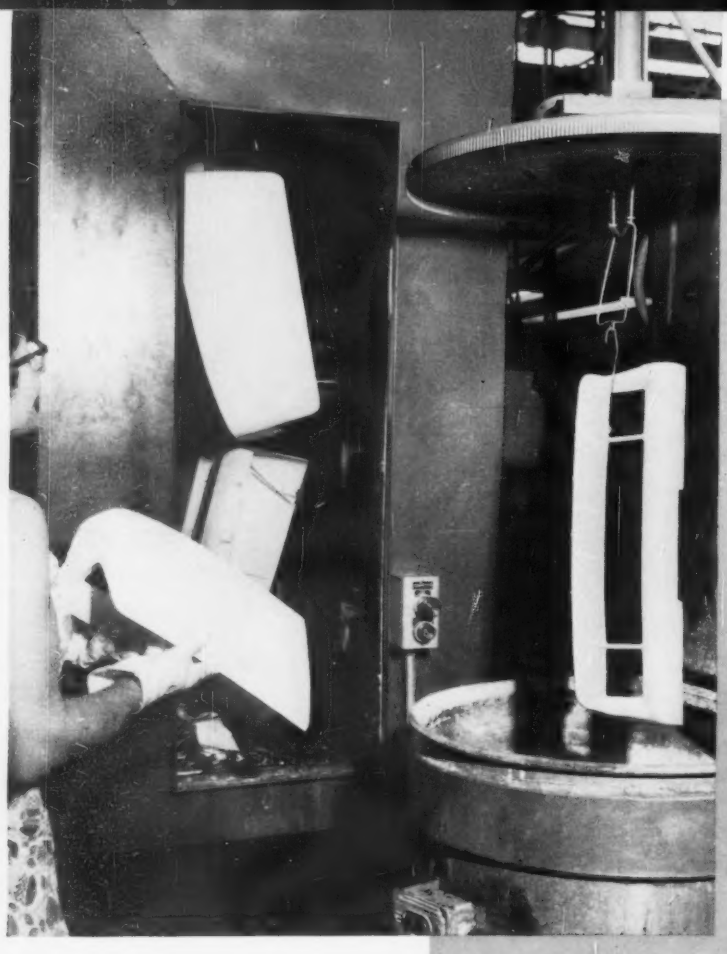
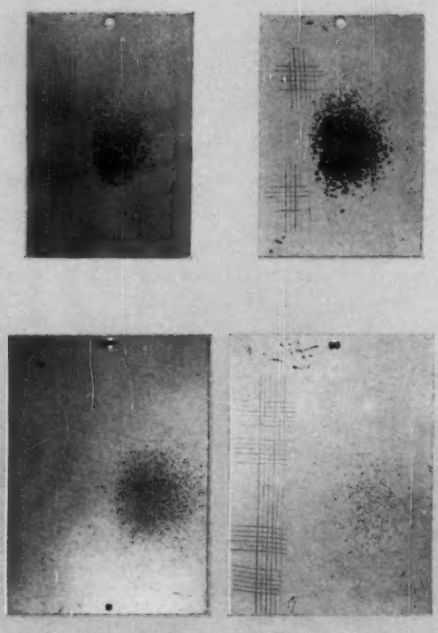


Satinizing of Tempest instrument cluster at Stimsonite Div., Elastic Stop Nut Corp. of America makes painting of Delrin plastic easier



Gravel impact test shows the adherence of paint to roughened Delrin (lower) and phosphate coated steel (upper) panels

Controlled Roughness: Paint Sticks

• BETTER BONDING of paints, or adhesives, to plastics is the result of a new process developed by Du Pont scientists, in which smooth plastic surfaces are roughened by a chemical treatment. The amount of the roughening action is uniform and controllable.

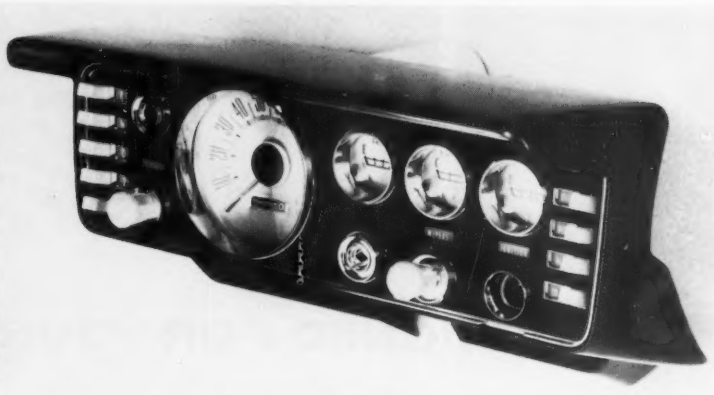
Disclosed by the Polychemicals Dept., E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., the prefinish treatment simplifies the painting of Delrin acetal resin. Previously, the plastic was roughened mechanically, or was treated with a special primer.

Coloring of the molded plastic is important for uses such as internal trim for automobiles, where paint is needed to match other sections of the interior. It is difficult to get exact matches between colors molded into plastics and those obtained by painting.

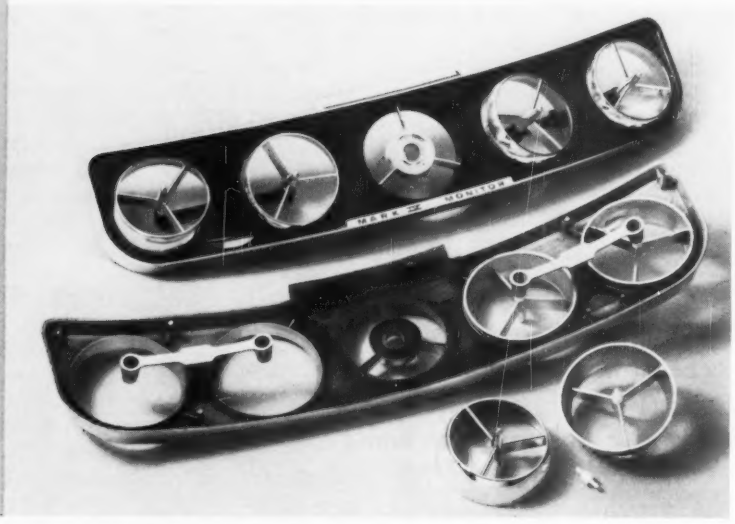
Du Pont expects that the development will widen the area of application for Delrin and possibly other thermoplastics which can be given similar treatments.

• Basis for the treatment, called Satinizing, is a chemical dispersion.

The chemical bath has three primary constituents: A chemical agent, usually acidic, such as p-toluenesulfonic acid; a liquid vehicle, usually perchlorethylene; and dispersed solid particles, such as the diatomaceous earths, clays, or ma-



Instrument panel for Valiant, painted after Satinizing, and . . .



Vacuum metallized air conditioner face plate show other applications

terials of high silica content.

The liquid vehicle aids in wetting and covering the plastic, as well as being a carrier for the other ingredients. Surface active agents to increase the wetting action and dispersing agents to suspend the other components may be added.

The chemical bath is operated at 175 to 250° F. Cooling coils above the bath, as in degreaser equipment, condense vapors and return them to the treatment tank. The work is immersed in the dispersion for a short time (about 10 to 30 seconds). That brings the part to temperature and coats it evenly.

• Most of the reaction occurs after the part leaves the solution tank.

When the part is removed from the treatment tank, it is placed in a heated and ventilated area. The air temperature is about 100 to 250° F. During the reaction, with acetal resins, some formaldehyde is liberated. That calls for exhaust equipment for both the dip tank and the air reaction chamber.

During the air heating stage, the volatile solvent evaporates; the chemical action that started in the treatment tank continues. Control of the air temperature and the treatment time govern the nature of the roughened surface that results.

• When roughening is complete, the parts are quenched in water and dried.

The water wash removes the reactants from the surface of the plastic, stopping the action quickly. A dip in hot water, followed by a spray, will aid in removal of the solid portion of the roughening composition. For exceptionally smooth coatings, such as metallized finishes, all of the solid material should be removed from the surface, the researchers report. For painting, the last traces of solids need not be removed.

Following washing, the parts are dried in air, and are then ready for painting or shipping.

• Because the roughened surface takes paint readily, treated parts can be processed on standard painting lines.

They are handled much like metal parts.

Uniform distribution of rugged peaks and valleys on treated parts shows up under a microscope. Uniformity permits even coverage by the paint film; the irregularities insure bonding of the paint.

• The process has particular advantages on irregular shapes.

Other methods of roughening the surface of plastic parts include flame treating and mechanical roughening by blasting or abrading, either dry or wet. The equipment for the new process is relatively simple.

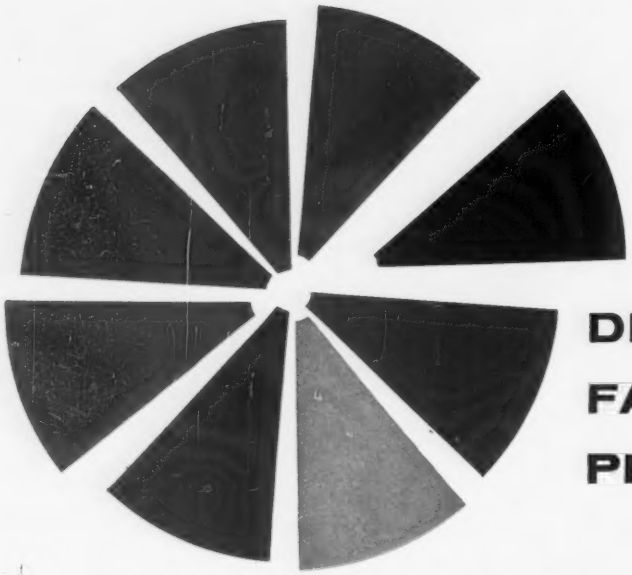
Because of its chemical nature, the etching is uniform even if the surfaces are irregular. There is little or no tendency to overetch protruding areas at the expense of depressed portions.

An additional advantage of the process, Du Pont notes, is the low concentration of the active etching agent in the solution. It is effective even at concentrations below 1 per cent.

• Maintenance of the process is not complicated.

Some of the liquid vehicle not recovered by the condensation system evaporates, but the amount is small in properly designed units. Losses of ½ pint per square foot per 8 hour day are usual; a corresponding amount of the liquid vehicle may be added periodically as make-up. The film dragged out on the work is replaced by fresh solution. Excessive exhaust will increase the rate of solvent evaporation.

Contamination of the solution with silicone oils or greases should



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be avoided, but hydrocarbon oils in small amounts do not interfere. The solvent will remove traces of such oils from the surface of the parts, aiding in cleaning.

The activity of the formulation can be evaluated by titration, and paint adhesion tests can be used to check the effectiveness of the process.

• Coatings of many types can be employed, including baking enamels.

For the intended purpose of matching painted metal panels, it is important that there should be little or no difference in the paint systems used. On Delrin, most paints can be applied after the roughening step. Nitrocellulose or acrylic lacquers, alkyd, polyurethane, epoxy and phenolic enamels have been employed, in standard commercial grades.

Delrin has high heat resistance compared with most plastics, so baking of the coating is possible. Temperatures may be as high as 290° F.

• Adherence tests show how the process insures good bonding.

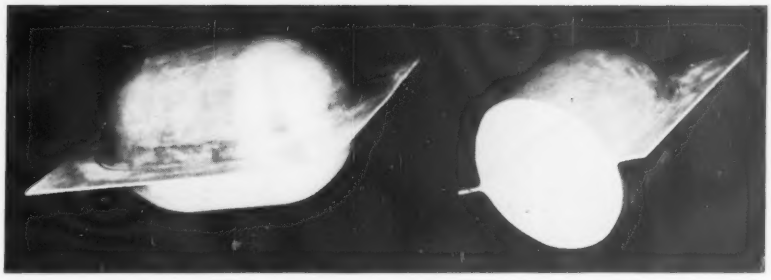
Two types of such tests have been used to demonstrate bonding.

A qualitative method is the Scotch tape test. The painted surface is scored by a pointed blade in a series of parallel lines 1/16 in. apart in two directions. Over this pattern, the tape is applied and quickly peeled off. Adhesion is judged by the amount of paint removed. To make the test more severe, the test can be applied after oven baking at 250° F.

The "gravel impact" test uses gravel sized Alundum. It's carried in a controlled air stream and allowed to impinge against the sample. The test permits evaluation of impact chip resistance of the coating system.

• Materials other than plastics may not be affected by the process.

Molded parts may contain inserts of other materials, such as studs, bolts, wiring, or threaded inserts. Experience with the process shows that neoprene rubber, cadmium plated steel, wrought iron, zinc, mild steel and stainless steels are not affected by the Satinizing treatment.



Aluminum sheets with low melting point centers are blown up following heating

Shape is controlled by hot dies. The dry air or gas used in the expanding process eliminates the need for internal cleaning

Tanks Formed from Single Sheets in Hot Die Process

• A PROCESS for fabricating hollow metal structures from single, specially rolled, aluminum sheets has been developed by Metal Specialty Co., Cincinnati, and Stolle Corp., Sidney, Ohio.

Applications cover numerous containers, tanks, and floats, including hydraulic systems, liquid or gas storage, gasoline cans and tanks, surge tanks, vacuum bottles, and fire extinguishers.

• The aluminum sheet has a center core with a lower melting point than the outer surfaces. The core melts when the sheet is processed in hot dies.

The dies are in a specially controlled, hydraulic press. While the sheet is in the press, dry air or an inert gas is injected by needle into the laminate to form a hollow part. Shape is determined by the dies. Internal cleaning, a problem with tanks made conventionally, is eliminated.

The flange around the circumference of the tank can be trimmed to any shape, or almost completely removed, if desired. It can also be used as a supporting bracket or base.

• The parts can be made to suit different pressure requirements simply by varying gage of the sheet.

A sheet totaling 0.120 in. holds up to 200 psi when expanded into a round tank. Greater pressures can be handled by increasing the gage.

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You can realize increased income combined with reduced cost when Bendix tape-controlled machine tools are used. Production saving of 80% in tool costs and lead time reductions of 75% have been experienced. It's likely that a new machine tool equipped with Bendix Numerical Control can help solve production problems. We'd be happy to answer your questions. Industrial Controls Section, The Bendix Corporation, 21820 Wyoming, Detroit 37, Mich.

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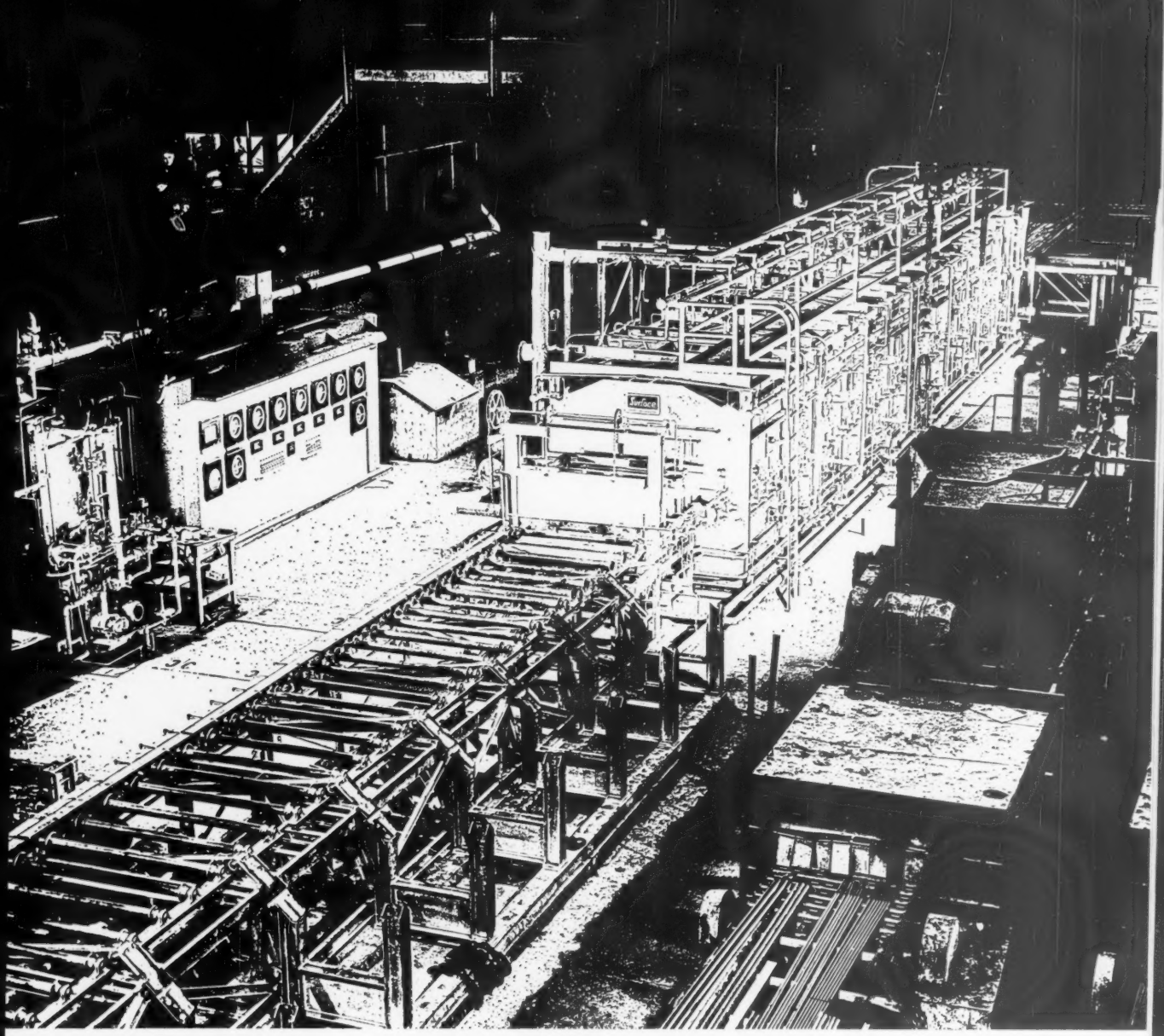

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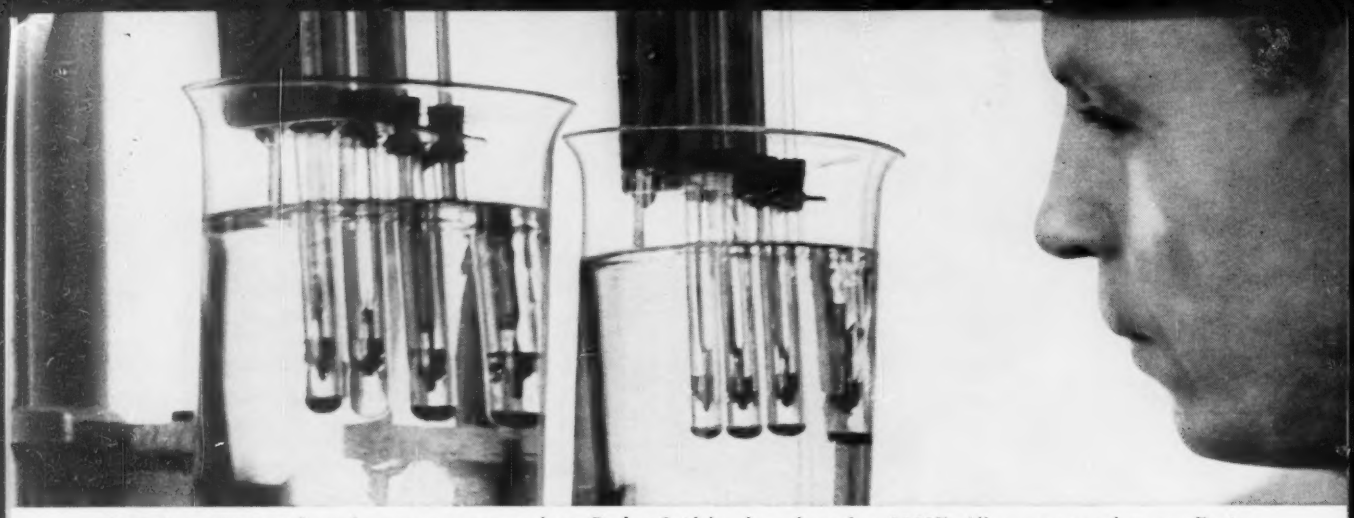
SURFACE COMBUSTION, Toledo 1, Ohio/ a division of Midland-Ross Corporation MR



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from left) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

THERE IS no soap in Darina Grease. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel—a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the grease does not soften. It shrugs off water—won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machinery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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A BULLETIN FROM SHELL
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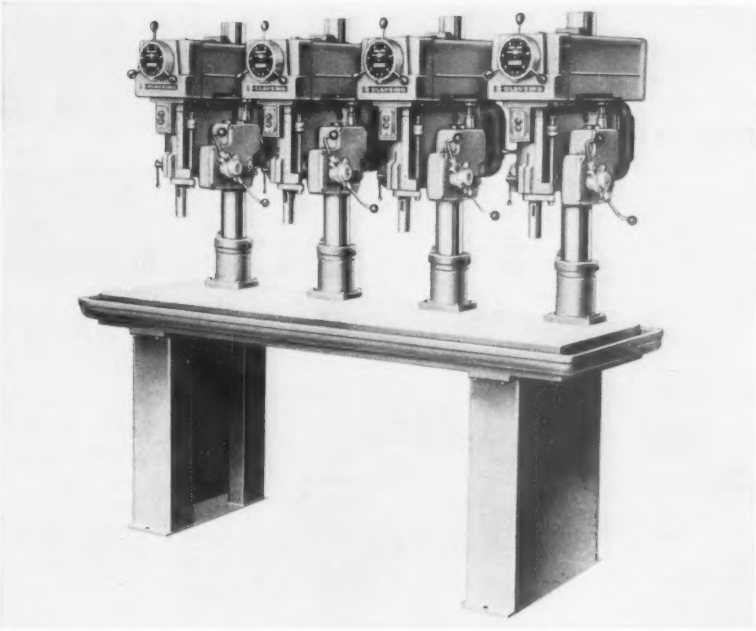
Three, Four Spindle Drills Heavier Throughout

HEAVIER throughout: That's how Clausing describes its 20 in., three and four spindle drills. They are rated at $1\frac{1}{8}$ in. in cast iron and $\frac{7}{8}$ in. in steel. The drills are available with a choice of two, heavy duty, countershaft drives—a positive power, variable speed drive that makes instantly available any speed (while the drill is running) and step pulley drives with five or ten speeds. Speeds range from 150 to 2000 rpm. Tables are $85\frac{1}{2}$ x $29\frac{1}{2}$ in.

Specifications: 10 in. from column to center of spindle, $9\frac{1}{4}$ in. from column bracket to center of spindle, $6\frac{1}{2}$ in. spindle travel, No. 3 MT spindle nose, and 25 15/16 in. maximum distance, spindle to table.

For further information, *write* Clausing Div., Atlas Press Co., 2459 N. Pitcher St., Kalamazoo, Mich.



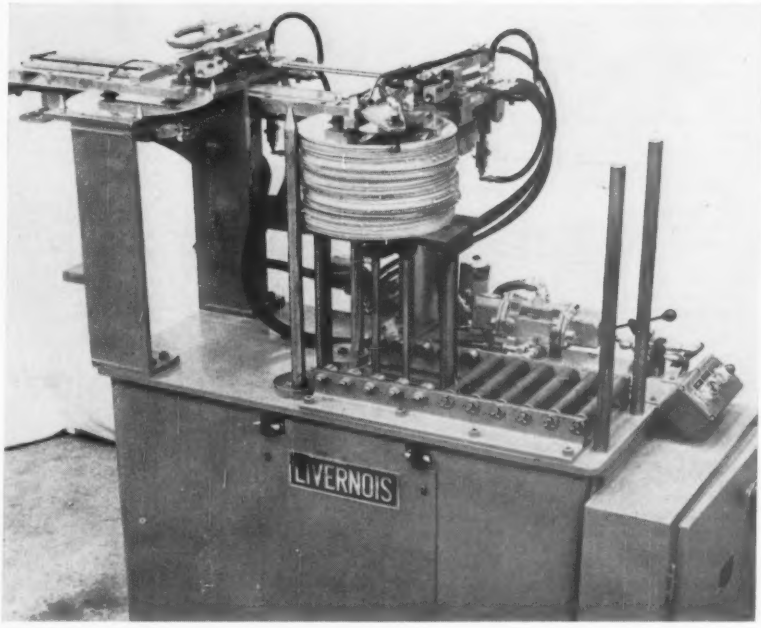
Feeder Checks Blanks to Prevent Die Damage

HERE is a sturdy blank feeder that will readily separate and transfer into a die round or irregularly shaped blanks of any material (ferrous or nonferrous). The manufacturer says it's especially successful in handling thin gage stock. Using a vacuum actuated pickup, the machine doesn't mar, scratch, distort, or damage highly polished or delicate surfaces.

To prevent die damage, a second or idle station checks blank thickness to stop double blanks. A double blank instantly stops the press, the feeder, and flashes a warning light.

The manufacturer says the idle station does not cut down on transfer distance and by this means allows cycle speed to be increased. Speed is variable and the unit can be quickly tied in to any press, says

(*Please turn to Page* 149)



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Alloy Foundries Division, The Eastern Co., Naugatuck

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Chicago Malleable Castings Co., Chicago 43
Moline Iron Works, Moline
Moline Malleable Iron Co., St. Charles
National Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

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Albion Malleable Iron Company, Muncie Division, Muncie
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Northern Malleable Iron Co., St. Paul 6

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Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

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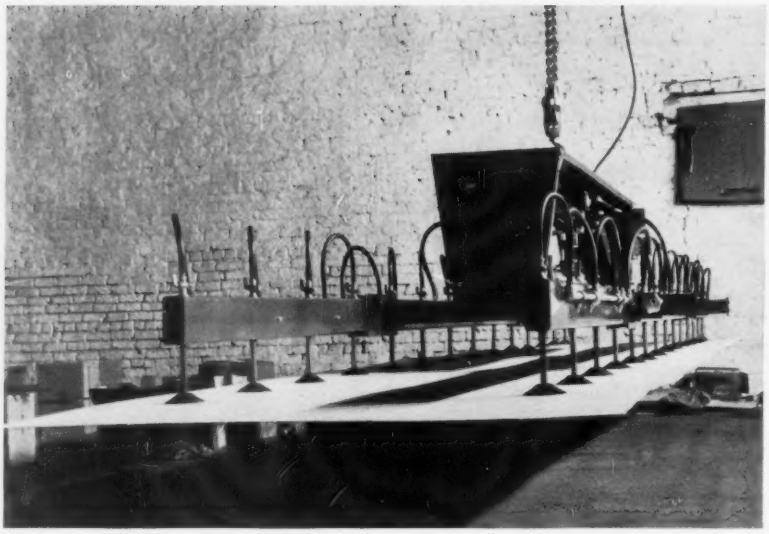
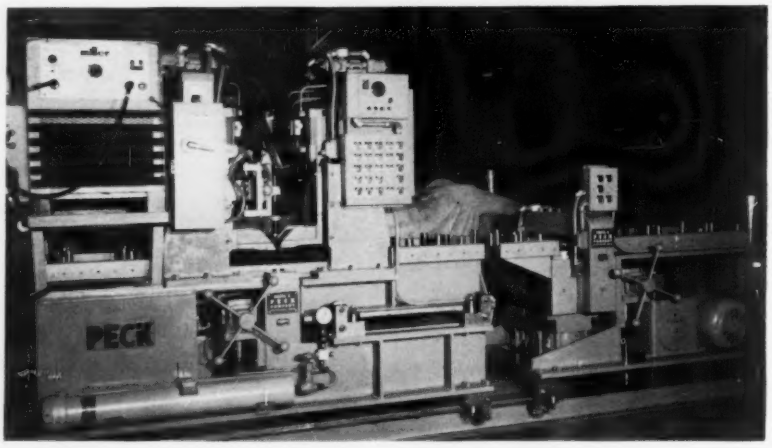


Vacuum Lifts 18 ft Aluminum Plates

VACUUM PADS lift 18 ft aluminum plates (part of the Saturn missile skin), solving the problem of sealing over milled slots 0.080 in. deep and of varying widths. Plates are handled gently, without marking or distortion.

The two pad beams are adjustable for different width plates. Outside vacuum pads are shut off to accommodate short plate lengths. Positive release is obtained by blowing air through the vacuum pads.

For further information, *write* Airlock Mfg. Co., 421 N. 20th St., Bessemer, Ala.



Splicewelder, Shear Up Productivity

A SHEAR and splice welder designed by Cecil C. Peck Co. boosted the productivity of an annealing oven 50 per cent. The equipment keeps the oven going continuously. The user, a specialty steel producer, can now supply coils in any length and in widths of 8 and 18 in. The Tig process is used for welding.

For further information, *write* Cecil C. Peck Co., 14901 Woodworth Rd., Cleveland 10, Ohio.

Post-Forming: New Way to Bigger Savings with Malleable Castings

The ductility of Malleable iron castings permits use of high-speed forming techniques to finish Malleable parts at lower cost. Take advantage of the versatility you get only with ferritic and pearlitic Malleable castings. For a fuller understanding of how Malleable can help you, call any producer that displays this symbol —

Free Folder describing these techniques is available for your use. Just ask any member of the Malleable Castings Council for Data Unit No. 116, or write to Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

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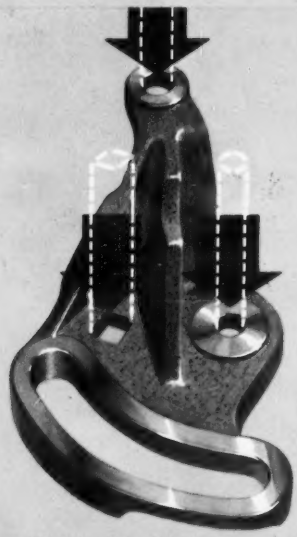
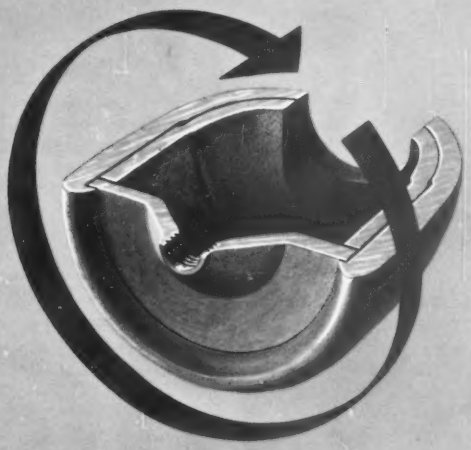
Hot Form It — Hot coining this Malleable transmission part reduces finished cost . . . eliminates three cutting operations required by the previously used steel part.

Roll It — Oil grooves in lawnmower crankshafts and splines in compressor crankshafts are just two of many places where rolling proves more economical than machining.



Punch It — Holes with diameters greater than the thickness of the metal can be punched in Malleable. Two round holes and a square hole are punched simultaneously in this idler arm.



Spin It — Malleable's ductility permits the sleeve and end disc in this ball joint to be held in place by spinning the Malleable housing into a strong, permanent flange.

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Induction Heating Anneals Pipe Welds ...In the Welding Line

Page Hersey Tubes Ltd., Toronto, Ontario, is one of several progressive manufacturers using Tocco induction heating to continuously anneal welds in electric seam-welded 4" diameter and larger pipe to improve ductility and toughness.

The Tocco engineered and built post-weld stations are installed in the line following the welding station. Special Tocco developed inductors, powered by two Tocco high frequency generators, heat the weld affected area on pipe up to 8" diameter 3/8" wall to 1700°F at mill speeds. Annealing is accomplished with no extra handling of the pipe and with metallurgical results at the weld area not possible by any other method. The cost is only a fraction of what it would be if the entire pipe were heated in a furnace.

This is typical of the scope and ability of Tocco's engineering staff to solve metal heating problems with induction heating. If your manufacturing operations require heating metal for forging, heat treating, melting, brazing or soldering, it will pay you to check with Tocco for the latest and most effective methods for increasing production and cutting costs.

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NEW PRODUCTS and equipment

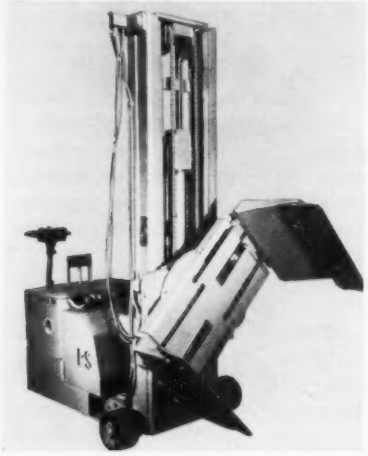
(*Continued from Page* 145)

the company. The feeder can also be used as a press unloader. When used for unloading, the thickness checker is locked out.

For further information, *write* Livernois Engineering Co., 25200 Trowbridge, Dearborn, Mich.

High Stacking of Rolls Job for Walk Type Truck

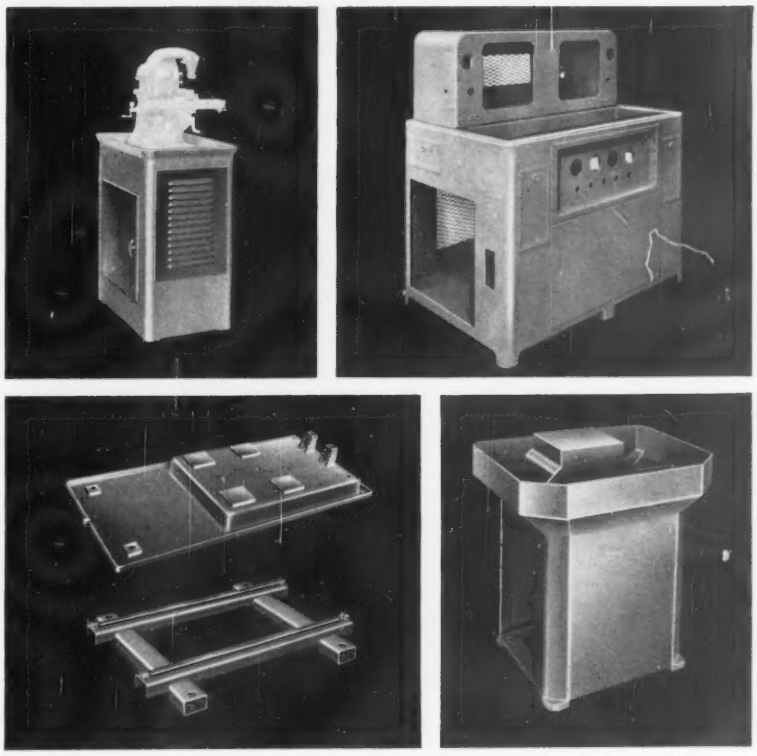
ROLL HANDLING in small volume warehouse operations can be facilitated by a high stacking, walk type truck. The counterbalanced unit has a low silhouette. It is capable of transporting rolls of various widths. The unit is available with a 12 or 24 volt system.



For further information, *write* Dept. R11-35, Lewis-Shepard Products Inc., 125 Walnut St., Watertown 72, Mass.

Induction Melting Unit Handles Furnaces, Coils

AN INDUCTION melting and heating power control handles jobs in small foundries and laboratories. Called the Inducto Integral 20, the console takes up less than 10 sq ft of floor space. The unit contains everything necessary for operation of either of two induction melting furnaces or heating coils. The equipment contains a new, high



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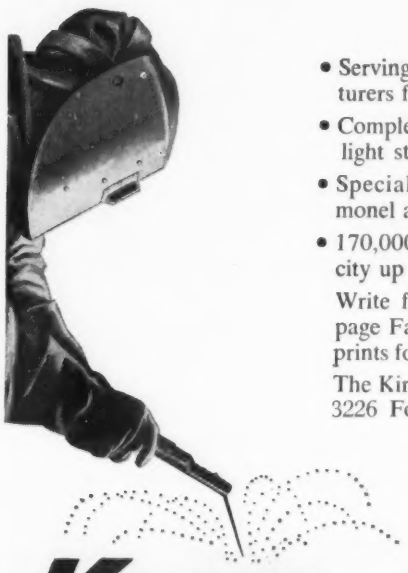

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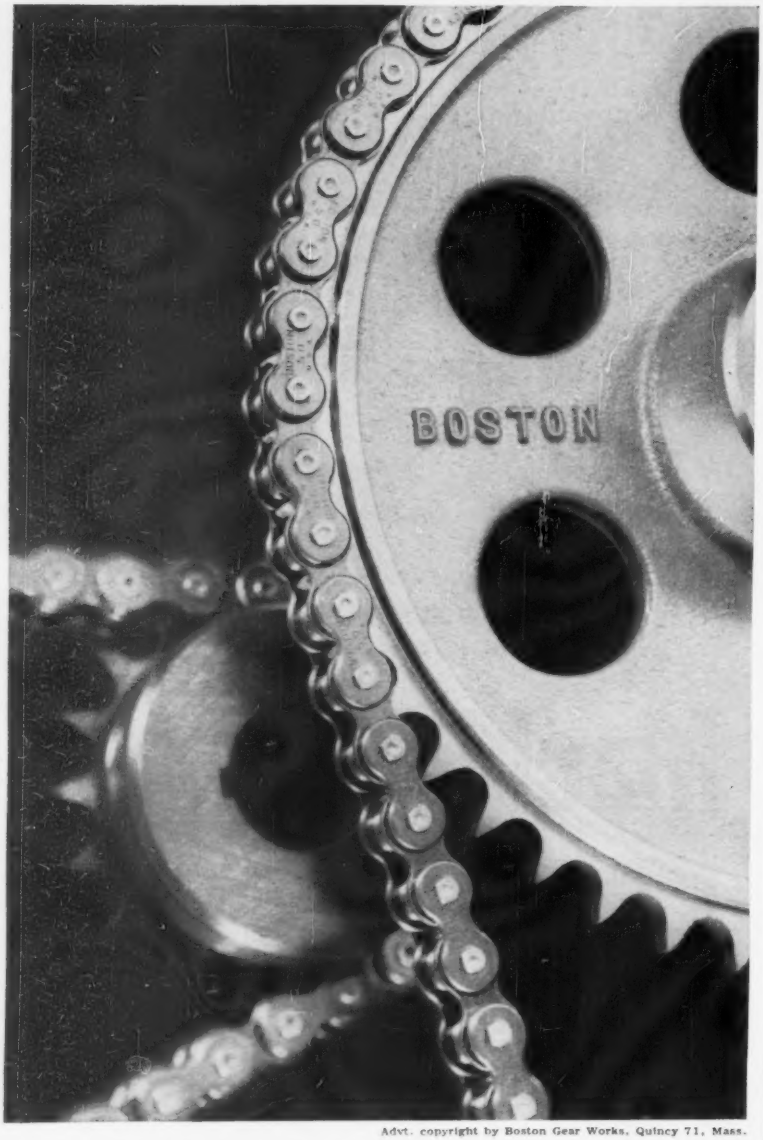

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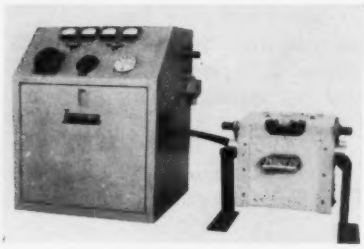


output, motor-generator set; capacitors; transformers; and all necessary controls and instruments.

For installation, the unit is connected to 220 or 440 volts, a water supply, and a drain. The console can be caster mounted.

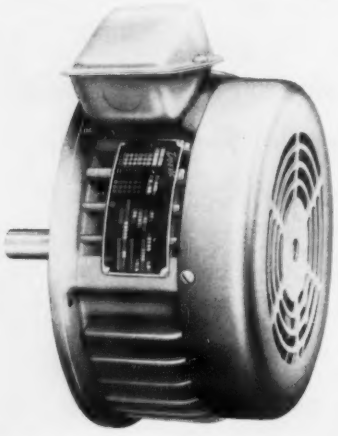
For further information, *write* Inductotherm Corp., Rancocas, N. J.

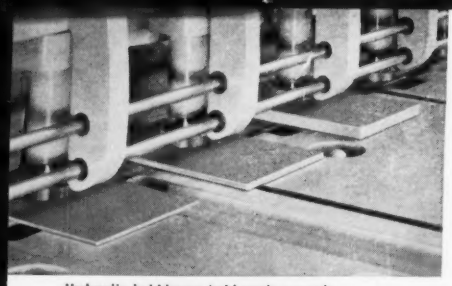
Short Length, Lightness Emphasized in Motor Line

A LINE of short, lightweight, electric motors known as the Doerr Compact series is designed with a shorter axial length than conventional motors of similar ratings. They weigh considerably less and some sizes are available in cast iron or aluminum.

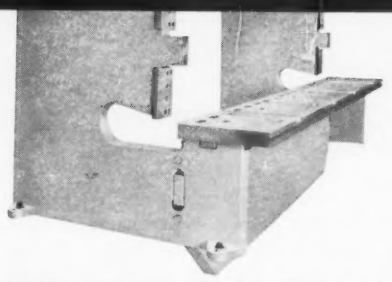
Ratings are available from 1 to 7½ hp and in all speeds, including 3600 rpm. Doerr expects to expand the line to include ratings up through 15 hp. In addition to the integral horsepower ratings, the motors can be ordered in a modified, compact design, shorter than normal length.

The units are made with a flange

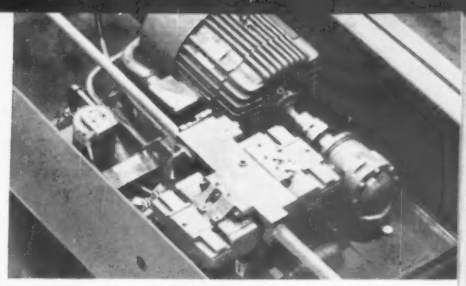




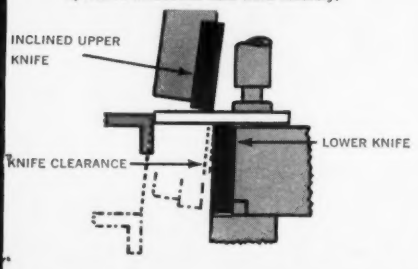
Hydraulic holddowns hold work securely.



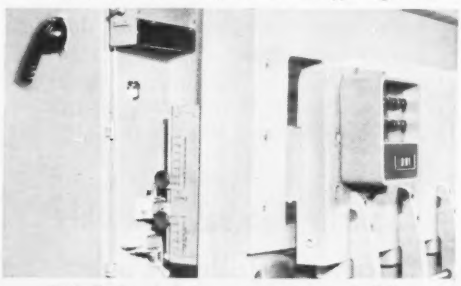
Interlocked construction eliminates load supporting welds.



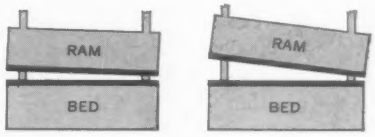
Compact manifold block replaces usual piping.



Inclined ram makes use of four edge knives practical.



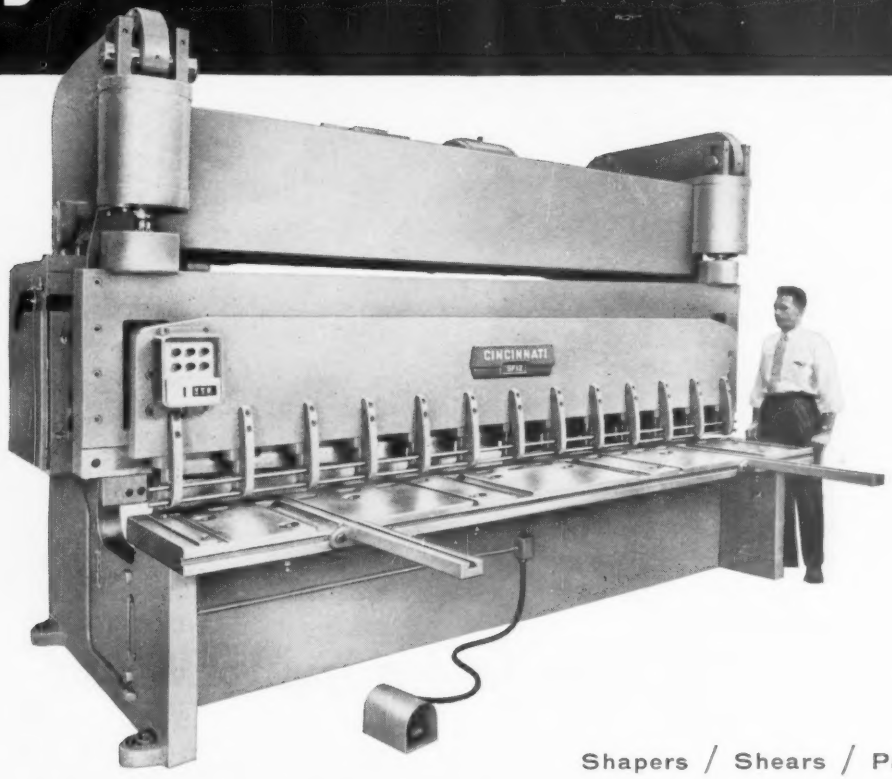
Centralized controls improve operator's productivity.



Adjustable rake gives you extra shearing capacity.

CINCINNATI®

hydraulic shears



Cincinnati Hydraulic Shears include in the standard price many features which cost extra on competitive shears. Several of these are shown above. Combined with an exceptional range of shearing capacity in one frame, they make any Cincinnati Hydraulic Shear a profitable investment. Request Bulletin HS-1 for complete details and features.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

United Kingdom: The Cincinnati Shaper Co., Ltd., Glasgow, Scotland

LET MUELLER MAKE IT!

Mueller Brass Co. of Port Huron is much more diversified than the name "Brass" implies . . . a lot more. In fact, because of its many and varied facilities . . . its *men, methods* and *metals* . . . Mueller is in the unique position of being able to offer true single source service.

MUELLER HAS THE MEN . . . experienced engineers with the ability to work out, creatively, tough design problems, and improve a part or components for production by the most economical method. You get sound engineering plus 45 years of practical metalworking production experience when you "Let Mueller Make It."

MUELLER HAS THE METHODS . . . when you "Let Mueller Make It", you are utilizing one single source that is able to produce parts any one of these ways: as forgings, impact extrusions, sintered metal parts, screw machine products, formed tube or as castings.

MUELLER HAS THE METALS . . . and the materials . . . to produce precision parts in aluminum, brass, bronze, copper, iron, and steel in hundreds of different alloys to meet each exact requirement.

In addition, Mueller Brass Co. has complete and modern facilities for performing all types of finishing and sub-assembly operations. Another plus value is nation-wide sales engineering service.

So, in the final analysis, no matter where you fit in the American industrial picture, whether you're making missiles or mowers . . . and no matter where you're located, it will pay you to LET MUELLER MAKE IT!

MUELLER BRASS CO.
PORT HURON 26, MICHIGAN

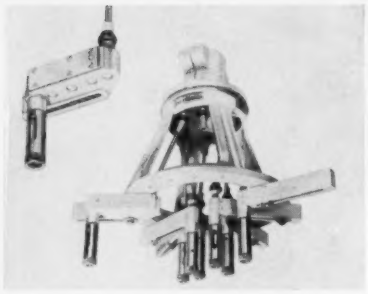
NEW PRODUCTS and equipment

or NEMA Type C, machined face mounting for a wide variety of close coupled applications. Types of construction include totally enclosed, fan cooled; totally enclosed nonventilated; and propeller fan duty types.

For further information, *write* Doerr Electric Corp., 507 N. Fourth Ave., Cedarburg, Wis.

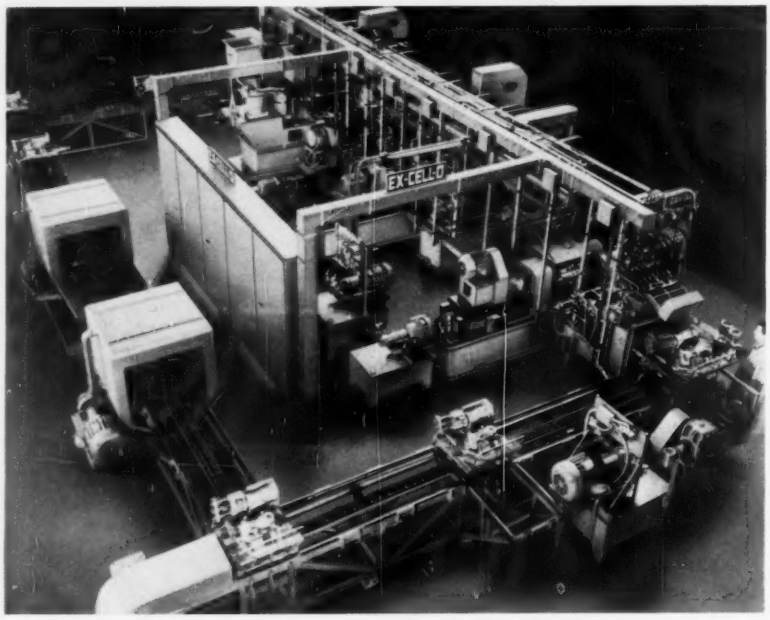
Spindle Bracket Assembly Increases Drilling Circle

A SPINDLE bracket assembly made by Thriftmaster increases a 10 in. drilling circle drillhead to 18¼ in. It provides a 4⅛ in. extension beyond the standard range of universal type drillheads.



Ball bearing construction is used. Drills up to ½ in. can be used in steel. The bracket enables drilling under the head flange of the drillhead as well as beyond it. Spindles are precision machined for use with jig bored spindle locating templates.

For further information, *write* Thriftmaster Products Corp., 1048 N. Plum St., Lancaster, Pa.



Pallets Used in Transfer Machine

A PALLET type transfer machine built by Ex-Cell-O produces aluminum, transmission extensions for autos. The closed loop unit is 46 ft long and 20 ft wide.

During each machining cycle, extensions are rough, semifinish, and finish bored; counterbored, faced, drilled, reamed, and tapped. A plain bearing is also assembled automatically.

Eighteen pallets index at each cycle. Two parts clamp in each pallet, one rotated at 180 degrees to the other. Pallets are designed for a load and reload operation, which carries each part through the

(*Please turn to Page* 156)

MUELLER CAN MAKE MOST ANYTHING IN BRASS OR ALUMINUM FORGINGS...

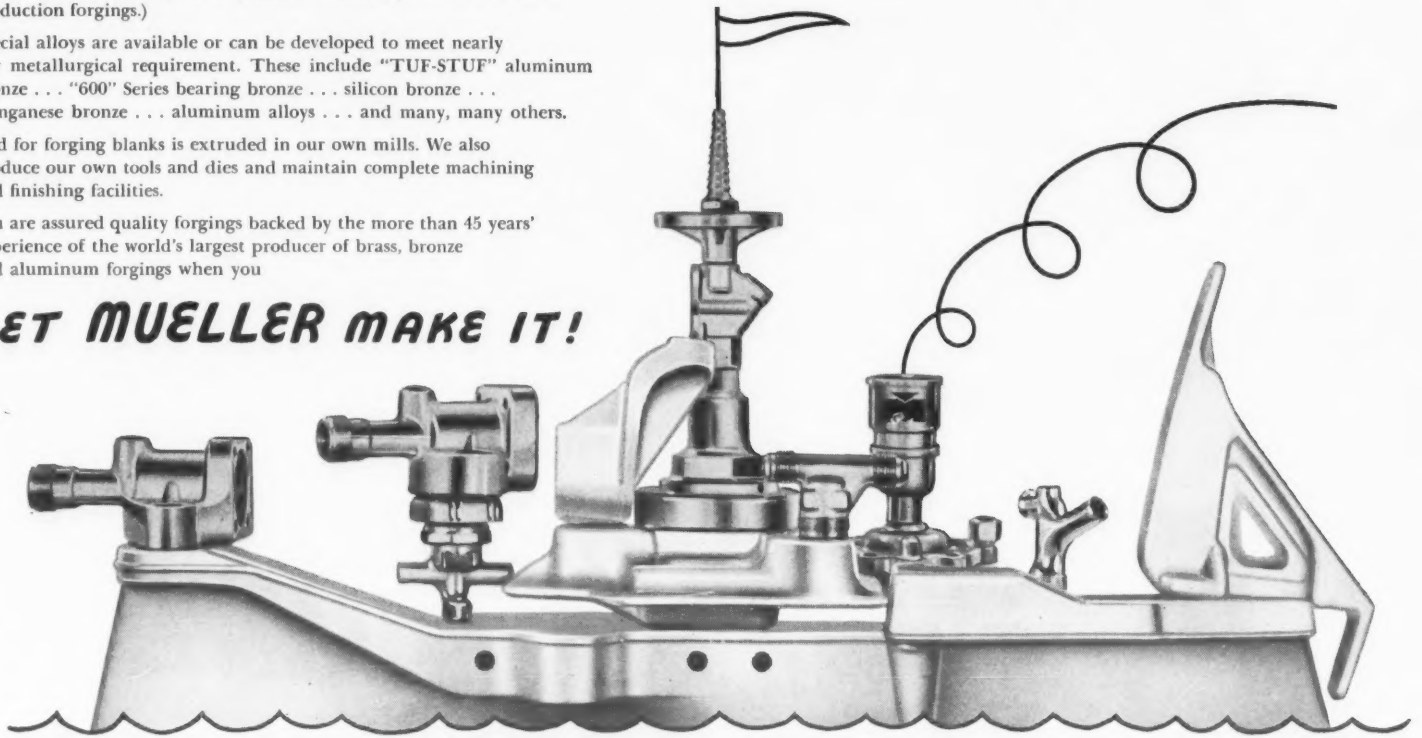
Battleships are not our business, but we can make any practical size and shape forging, including cored forgings and those with bosses or cavities on two planes. (The ship model is made up from a number of production forgings.)

Special alloys are available or can be developed to meet nearly any metallurgical requirement. These include "TUF-STUF" aluminum bronze . . . "600" Series bearing bronze . . . silicon bronze . . . manganese bronze . . . aluminum alloys . . . and many, many others.

Rod for forging blanks is extruded in our own mills. We also produce our own tools and dies and maintain complete machining and finishing facilities.

You are assured quality forgings backed by the more than 45 years' experience of the world's largest producer of brass, bronze and aluminum forgings when you

LET MUELLER MAKE IT!



Write today for Engineering Manual FM-3018

MUELLER BRASS CO.

PORT HURON 26, MICHIGAN

351

Here's how to contact such a man

Your Product Design Committee should include an extruder

WITH THE HELP of quickly available extrusion specialists, more and more companies have discovered that they can now save substantially by replacing rolled, crimped, welded, machined and assembled parts with low-cost aluminum extrusions.

Have a nearby independent extruder analyze your own product line right away. And consult him regularly from now on. The chances are excellent that with his specialized up-to-date knowledge of extrusions he can help you make major savings.

A helpful product analysis is just one reason, however, for calling on an independent extruder. *Fast service* is another. He's at hand when you need him. Your order is important to him. And it doesn't have to wait for hundreds of others.

Quality is equally important. Your nearby extruder offers the consistent quality of a specialist—the consistent quality of a supplier who takes a personal interest in your business.

It's good business to know your nearby independent extruder . . . a specialist supplied with top-quality aluminum ingot by Aluminium Limited.

Supplying metal and ideas to companies that work with aluminum

ALUMINIUM LIMITED

Aluminium Limited Sales, Inc., 111 W. 50th St., New York 20, N. Y.

ALCAN

MAIL THIS COUPON FOR EXTRUDER NAMES AND ADDRESSES:

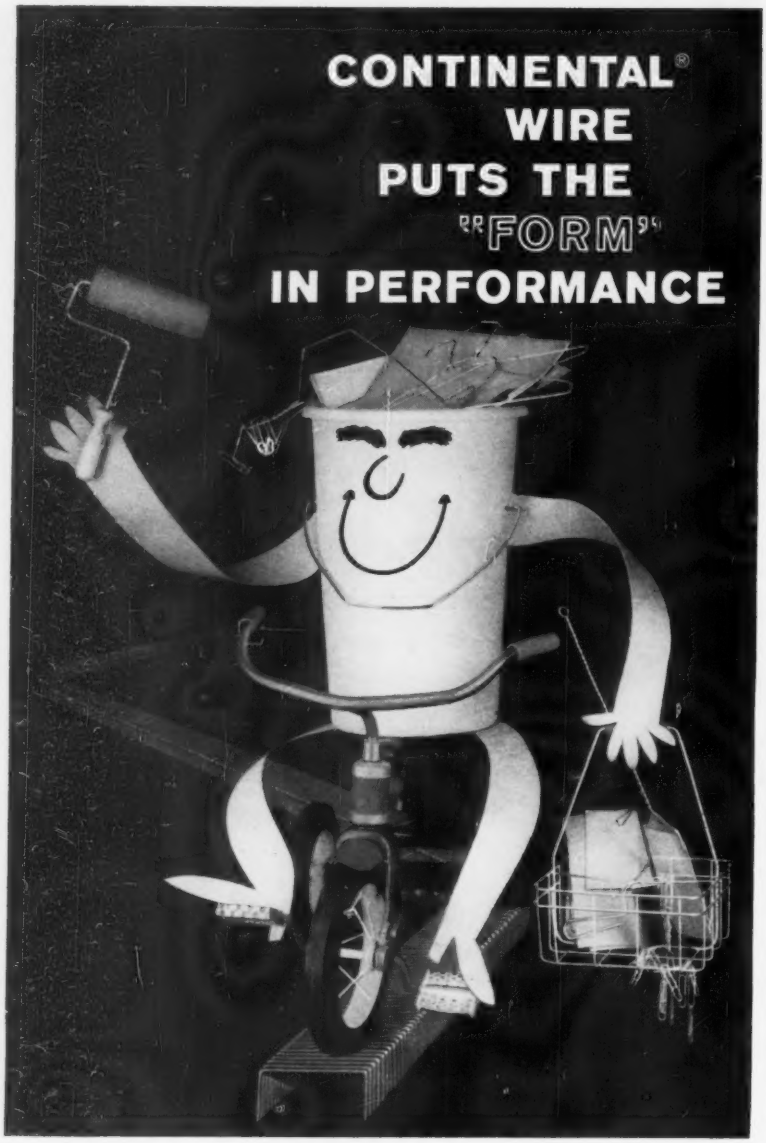
ALCAN

Aluminium Limited Sales, Inc., 111 W. 50th St., New York 20, N. Y., Dept. ST-12
Please send me a list of Independent Extruders in this area.

Name_____ Title_____

Company_____ Address_____

City_____ Zone_____ State_____



Formability that permits difficult twists and bends . . . sustained fast production in coil after coil . . . smooth tight coatings that do not powder, flake or peel to jam machines. Such wire calls for consistent, uniform quality. You can get it at Continental, in sizes and finishes to meet most specifications—from 7/16" on down to 40 gauge, in various tempers and analyses, in low and medium low carbon steels. Special shapes, too. Why not let our mill technicians work with you on any problems you may have pertaining to wire fabrication. We may have the answer to a particular need. Write today for your FREE copy of our new wire manual.

Wire Specialists for over half a century

CONTINENTAL STEEL
CORPORATION KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

NEW PRODUCTS and equipment

(*Continued from Page* 152)

machine twice and produces one finished part per cycle. Pallets accept two different components and various length parts. The setup shown demonstrates the machining of a short part.

For further information, *write* Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Central Generator Powers Remote Ultrasonic Units

SIMULTANEOUS operation of a variety of remote, ultrasonic operations from a central generator is a feature of a system developed by International Ultrasonics.

One, two, or three remote operations of any type, including cleaning, welding, soldering, tape and film splicing, emulsification, and plastic bonding may be conducted simultaneously at different power levels and frequency values, the company says.

The design can be extended to power 20 or more operations simultaneously.

Fixed or portable ultrasonic heads are simply plugged into the modular, central generator from work stations up to 100 ft away. Individual oscillators for each head can be rack mounted at the central generator; or the compact, lightweight, oscillator modules can be located at remote work stations if the work requires many frequency changes. Piezoelectric, magnetostrictive transducers, or both may be used with the generator.

For further information, *write* International Ultrasonics Inc., Cranford, N. J.

Woven Nickel Base Wire Resists Heat, Oxidation

A NICKEL base wire (Rene 41) is being woven into cloth by National Standard. Filtering and other applications are expected in spacecraft, missiles, rockets, electronics, and some nuclear equip-

For "X" months under the sea—

every weld must be sound

By use of radiography defective welds are detected and corrective measures can then be taken.

To make sure, Electric Boat, division of General Dynamics Corporation, checks every weld by radiography, using Kodak Industrial X-ray Film, Type AA.

The welded hulls of today's nuclear subs contain a maze of intricate piping, machinery, controls and equipment—much of it welded. Radiography of these welds has helped Electric Boat of Groton, Conn., pile up phenomenal records of dependable performance.

At Electric Boat, every weld that radiography shows to be less than perfect is repaired or replaced. It is the only way to be sure that superb performance will not be marred by a "weak link."

Radiography is a great protector of quality. It can assure the welder and the foundryman that only good work leaves the shop.

If you would like to learn more about radiography in terms of what it can do in your own business, talk it over with an X-ray dealer or write us to have a Kodak Technical Representative call.

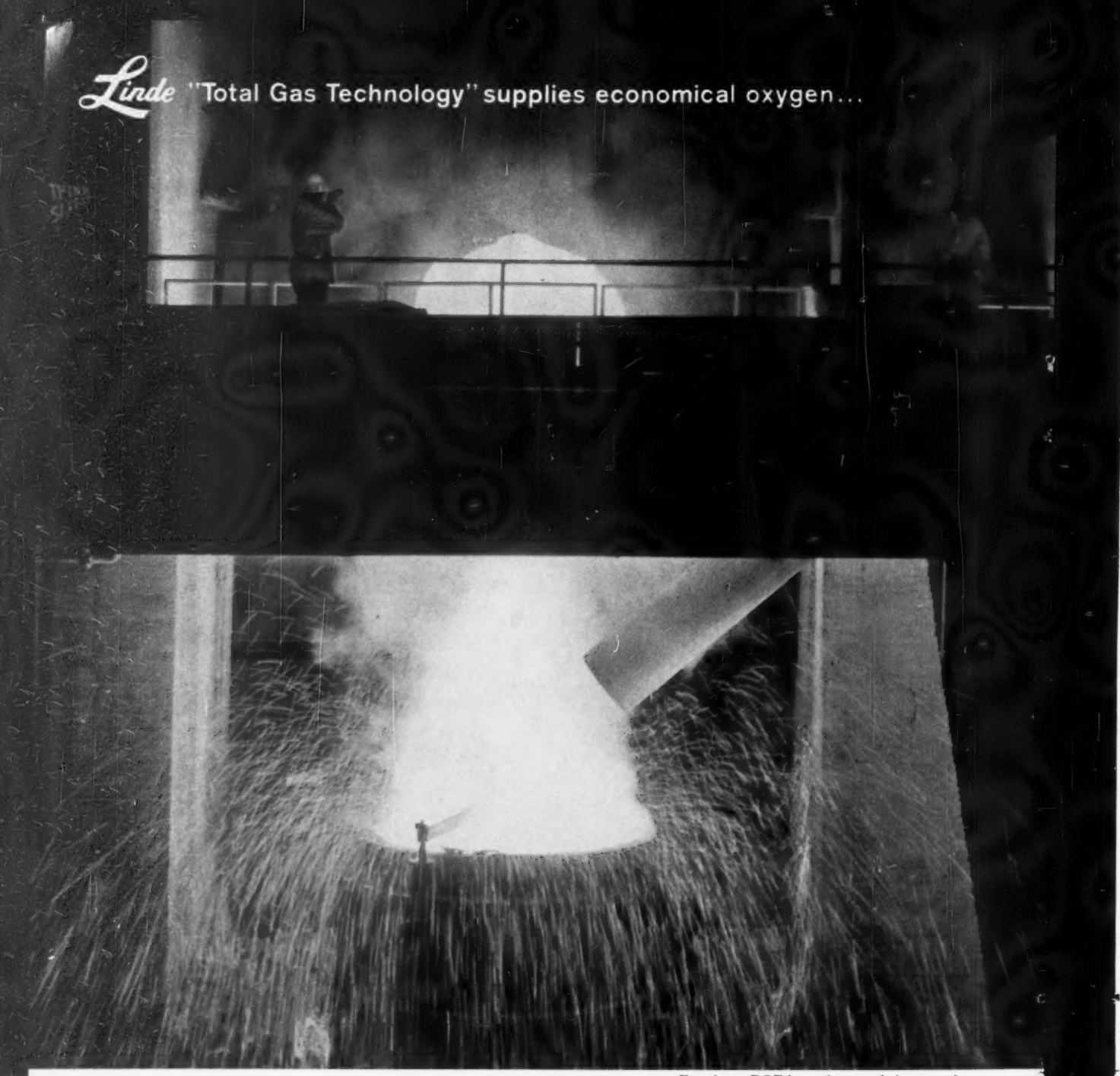
Now in the new Ready Pack—Kodak Industrial X-ray Film, Type AA and Type M.

- ☑ No darkroom loading—each sheet sealed in a light-tight envelope.
- ☑ Just place Ready Pack in position and expose—film protected from dust, dirt, light and moisture.
- ☑ In the darkroom—just pull the rip strip, remove film and process.
- ☑ Available also in rolls of 16mm, 35mm, and 70mm widths, 200-foot lengths

EASTMAN KODAK COMPANY
X-ray Sales Division Rochester 4, N.Y.

Kodak
TRADE MARK

Linde "Total Gas Technology" supplies economical oxygen...



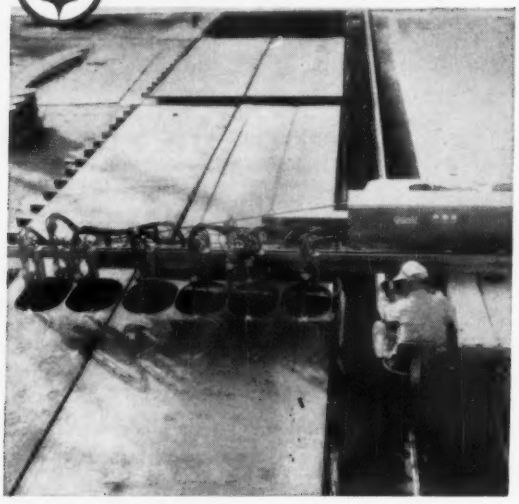
Pouring a BOP heat that used six tons of oxygen.

OXYGEN DOESN'T COST—IT

Every LINDE oxygen customer uses oxygen to save money. In some cases, this is a potential of as much as $4 an ingot ton in the steel-making furnaces alone. ✦ And LINDE's liquid oxygen system can supply supplemental oxygen—for peaks of demand, or full-scale tests—in tonnage quantities. A LINDE-supplied mill doesn't have to wait for a new oxygen plant to start using a new process. ✦ "Total Gas Technology" means more than economical oxygen. New processes, equipment, services are combining to lower production *and* fabricating costs, thus helping to sell steel. *Note two more examples at right.*

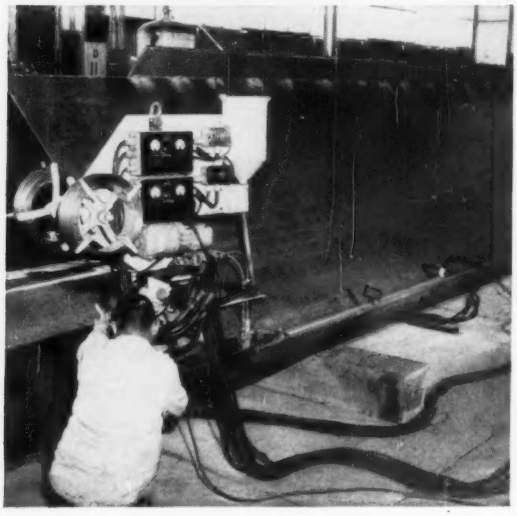
"LINDE," "UNION CARBIDE," AND "UNIONMELT" ARE REGISTERED TRADE MARKS OF UNION CARBIDE CORPORATION, AND USED BY ITS DIVISION, LINDE COMPANY, 270 PARK AVE., N. Y. 17.

Steel costs lowered by modern technology



New LINDE CM-60 automatic shape-cutting machine. Get top duty cycle and precision cutting of intricate steel parts–directly from line drawings.

Dual electrode UNIONMELT welding speeds attachment of stiffeners in making railroad gondola cars, reducing steel fabricating costs.



PAYS

LINDE COMPANY

UNION CARBIDE

ment. The material resists heat and oxidation.

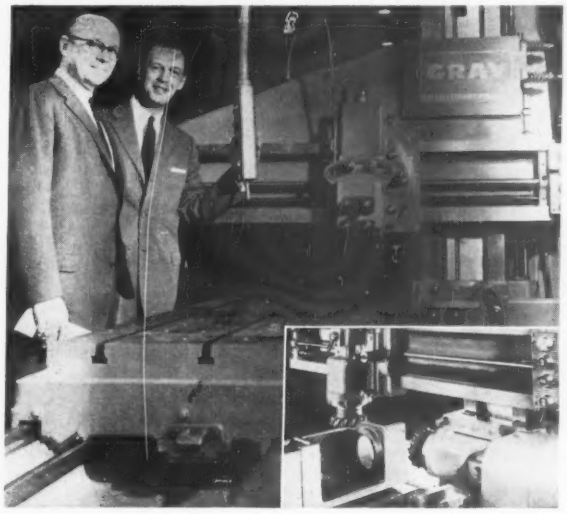
Widths from 24 to 48 in. are available. Other sizes can be furnished on special order.

For further information, *write* Dept. RDT, National-Standard Co., Niles, Mich.

Design Permits Custom Tools From Standard Components

A COMPACT, budget priced, machine tool offered by G. A. Gray has the capabilities of planning and milling, separately or in combination.

The company says the design makes it possible to build a machine to exact user requirements at no premium in cost by using standard, interchangeable rail and side heads.



One basic body is used. Equipped with planer heads, the unit becomes the Flying Scot planer. With milling heads added to the basic frame, the machine becomes the Handymill. For users requiring planing and milling, any combination of planer or milling heads on the rail or side is possible.

The unit is available in 30, 36, and 42 in. table widths. Table feeds on the mill range from 1 to 40 in. per minute. Planer speeds: 30 to 300 ft per minute.

For further information, *write* Dept. V, G. A. Gray Co., Cincinnati 7, Ohio.

Color Monitor Detects Hue, Density Changes

ACCURATE and continuous full range color inspection of a wide variety of products is possible with a device offered by Hurletron.

The production tool can detect variations before they are noticeable to the eye. It automatically breaks up

Coming

Jan. 1

IN

STEEL

Let's Overcome

TECHNERTIA

Technertia is coined from two words—technology and inertia. Our definition: Slowness to adopt new technology.

American industry suffers from technertia. On the average, ten years elapse between the laboratory and production stages of a major idea.

Technological improvements can help metalworking reduce costs, improve quality, and better compete in domestic and world markets. That's why STEEL's Metalworking Yearbook issue, Jan. 1, will be devoted to a study of how to move ahead faster in industrial science.

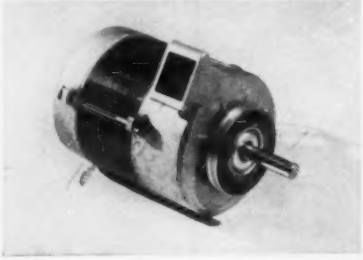
NEW PRODUCTS and equipment

the inspected color into segments of the visible spectrum, permitting accurate and independent indication of variations in each.

For further information, *write* Electric Eye Equipment Div., Hurletron Inc., 1938 E. Fairchild St., Danville, Ill.

Shaded Pole Motor Powers Wide Variety of Equipment

A SHADED POLE motor designed by a subsidiary of Controls Co. of America operates at 1700 rpm. Cooling is handled by a ventilating system that moves air through the motor. Almost silent operation is achieved by designing parts to tolerances of 0.0001 in.



Already in use in IBM's Selectric electric typewriter, the motor can be applied in tape recorders, electronic computers, temperature and other sensitive scientific recording equipment, cash registers, vending equipment, and electric organs.

For further information, *write* Controls Co. of America, 9555 Soreng Ave., Schiller Park, Ill.

Electrohydraulic Power Employed for Forming

ELECTROHYDRAULIC power equipment which produces shock waves to form metals has been introduced by GE.

Titanium, columbium, stainless steel, tungsten, and beryllium alloys are among the metals that can be formed.

The company says the equipment is adaptable to installation in a production line; requires a relatively

Second Offering

For Sale

U. S. GOV'T

SURPLUS PLANT

Numerous Conversion Possibilities

Located in San Francisco Bay Area Industrial tract between Pittsburg and Antioch, California
Formerly Pacific Ordnance Steel Foundry

SEALED BID OPENING JANUARY 17, 1962
(3:00 P. M. PST)

★ Ready to operate Steel Foundry consisting of 31-Foundry, Utility and Administrative Buildings on approximately 41.146 acres. Buildings and equipment maintained in a "ready status." ★ Strategically located in rich, Pittsburg-Antioch Industrial Area and adjacent to existing Columbia-Geneva Steel Mill, Shell Chemical Co., U. S. Steel, Linde Air Products, Pacific Gas & Electric, etc. ★ 50 minutes from San Francisco-Oakland Bay Area with easy access via State routes #24 and #4. Proposed freeway will link area with Oakland within a few years. ★ Adequate existing residential area housing industrial workers nearby...new residential sub-divisions developing rapidly. ★ Served by Santa Fe Railroad spur track. Located near shipping channels. ★ Attractive Financing.

WRITE OR TELEPHONE FOR INVITATION, BID & ACCEPTANCE FORMS NO. GSA-UDS-9-LB-3 AND DESCRIPTIVE BOOKLET TODAY.

GENERAL SERVICES ADMINISTRATION

Utilization & Disposal Service • Business Service Center
49 Fourth Street • Phone YUkon 6-3500, Ext. 3426
San Francisco, California

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND FOUNDRY

DIVISION OF GORDON STREET, INC.

CHATTANOOGA 2, TENN.

small investment in dies and facilities; operates in a simple, repetitive fashion; and features high accuracy, part reproduction. GE has formed pieces up to 20 in. wide and 3/32 in. thick and sees the possibility of fabricating larger sections.

Operation: The metal, die, and an electrode assembly are submerged in a tank of water. A capacitor bank, charged by a high voltage, power supply, releases electrical energy in an arc which heats, vaporizes, then converts the water to plasma. The rapid heating and expansion of the plasma produces a shock wave which uniformly stretches the workpiece to conform to the die shape. Fabrication takes place in millionths of a second.

For further information, *write* High Voltage Specialty Transformer Section, General Electric Co., Holyoke, Mass.

Flexible Coating Resists Water, Acids, Alcohol

A FLEXIBLE, watertight coating, Liquid Vinyl, resists alcohol, salt, mildew, acid, kerosine, fatty acids, and industrial soil. It's recommended by the maker for protection of plating racks and tanks and for masking purposes. A special solvent is available for removal of the coating. The material can be easily applied by brush, dip, spray, or roller.

For further information, *write* A. L. Okun Co. Inc., Jamaica 20, N. Y.

Degreaser Combines Boiling Sump, Ultrasonics

THE COMBINATION of a boiling sump and an ultrasonic cleaning system in a single unit permits processing up to 1500 lb of steel per hour. Boiling solvent removes most of the grease and oil, and ultrasonic energy eliminates the last traces of residue.

Only the ultrasonic chamber need be used for cleaning lightly soiled parts.

Both the boiling sump and the ultrasonic chamber are 12 x 18 x 24 in. deep. Available with steam or electric heating, the degreaser

NORTHERN

OVERHEAD ELECTRIC TRAVELING CRANES

Better Designed, Better Built

The 30-Ton Northern Heavy Duty Crane shown above is in the die and machinery storage yard of a high production automotive manufacturing plant. It is one of a total of nine Northern Cranes installed, *in several repeat orders*. The others are in the receiving, die shop, production departments and the plant power house.

This installation emphasizes the dependable engineering, construction and performance which has earned these repeat orders. Northern Cranes provide maximum assurance that production operations and safety can be maintained at favorable high levels; costs and downtime for maintenance are kept at a minimum.

For precise production control, specify precision designed and built Northern Cranes.

Sales representatives in all principal cities

NORTHERN MATERIALS HANDLING EQUIPMENT

NORTHERN ENGINEERING WORKS
210 CHENE ST., DETROIT 7, MICH.

look overhead . . . see "NORTHERN"

CAPACITY FOR FAST DELIVERY ON CUSTOM REQUIREMENTS

SPUR-HELICAL-WORM-HERRINGBONE-BEVEL

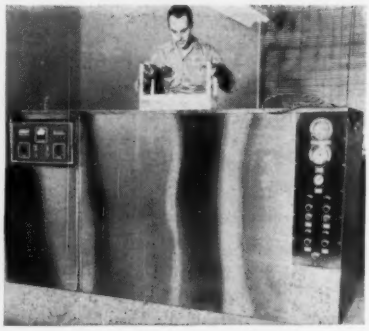
LARGE INDUSTRIAL GEARS and SPEED REDUCERS

Horsburgh & Scott maintains one of the industry's largest stocks of patterns . . . special tooling and special equipment—enabling us to engineer and produce a wide range of custom gearing and transmission requirements practically as fast as you can obtain them from stock sources. Write for information and estimates. Ask for our new Full Line Brochure.

H&S The HORSBURGH & SCOTT CO.
5112 Hamilton Ave. • Cleveland 14, Ohio

Manufacturers of Gears and Speed Reducers for over 75 years

NEW PRODUCTS and equipment



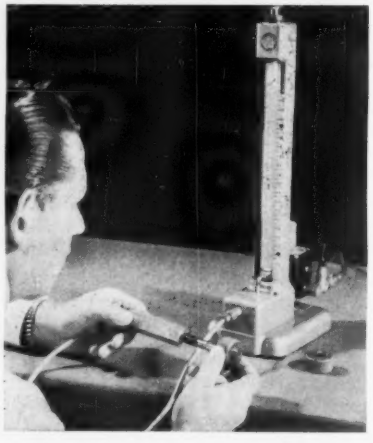
(LAC-100) is protected by thermostats and automatic liquid level controls.

For further information, *write* Branson Instruments Inc., 40 Brown House Rd., Stamford, Conn.

Economy, Compactness Stressed in Air Gage

SINGLE dimension inspection is the purpose of a compact, economy model, air gage added to Sheffield's Precisionaire line.

The gage weighs 5 lb, is 18 in. high, and requires less space than the spread of a hand. The company says the unit was developed to bring low cost, accurate, air gaging within the reach of all metalworking plants requiring accurate dimensional reading of part deviation.



Typical measurements that can be checked include height, width and depth, internal and external diameters, flatness, and concentricity.

For further information, *write* Sheffield Corp., Dayton 1, Ohio.

56-inch semi-continuous hot strip mill.

BLAW-KNOX HOT STRIP MILLS

Blaw-Knox designs and builds a full range of continuous, semi-continuous and single stand reversing hot strip mills. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals. • Sheet and strip processing equipment. • Electrolytic tinning, annealing and galvanizing lines. • Seamless pipe and tube mills. • Draw benches, and cold draw equipment. • Blaw-Knox Medart cold finishing equipment. • Iron, alloy iron and steel rolls. • Carbon and alloy steel castings. • Fabricated steel plate or cast-weld design weldments. • Steel plant equipment. • Heat and corrosion resisting alloy castings. • Blaw-Knox Company, Foundry and Mill Machinery Group, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

BLAW-KNOX

Blaw-Knox designs and manufactures for America's growth industries: METALS: Rolling Mills • Steel Processing Lines • Rolls • Castings • Open Hearth Specialties • PROCESSING: Process Design, Engineering and Plant Construction Services • Process Equipment and Pressure Piping • CONSTRUCTION: Concrete and Bituminous Paving Machines • Concrete Batching Plants and Forms • Gratings • AEROSPACE: Fixed and Steerable Antennas • Radio Telescopes • Towers and Special Structures • POWER: Power Plant Specialties and Valves

"are you getting your metal's worth?"

Without the castability and dimensional stability of Zamak, these almost microscopic gears and their precise housing would have been impossible to die cast. The eleven castings make up a counter assembly for an elapsed time indicator and together weigh less than half an ounce. A high degree of accuracy is essential. The ten-tooth bevel gear above the dime is just .063" in height. • Spectacular unit cost savings of 91.5% were achieved by zinc die casting, instead of machining the housing from aluminum bar stock and the gears and counter wheels from brass. All openings in the two-piece housing are die cast, even to the small crescent-shaped slots in the sides which permit the outermost gears to clear the housing wall. • This subminiature counter assembly is the heart of the Bowmar Instrument Corporation's Model 1440 Elapsed Time Indicator. It is a decimal type indicator, with numerals one-eighth inch high permitting readout up to six feet away. Standard, concentric circle-dial type indicators have numerals only a few hundredths of an inch high. • The Bowmar ETI must conform to military specifications and is used on digital computers such as the Army's FADAC (Field Artillery Digital Automatic Computer), where it determines the amount of time FADAC has operated, permitting equipment check-out at specified intervals. • These tiny castings demonstrate the tremendous versatility of the Zamak alloys, invented, pioneered and perfected by The New Jersey Zinc Company. Are you getting your metal's worth? To find out, write today to NJZ.

NJZ

THE NEW JERSEY ZINC CO.
160 FRONT STREET • NEW YORK 38, N. Y.

Die castings by Hadlock & Temte, Inc., Chicago

NEW literature

Write directly to the company for a copy

Red Lead Paint Systems

Recommended paint formulations and paint systems for a wide variety of exposures are published in a 32 page booklet, *Lead Pigments Technical Letter No. 15—Red Lead Based Paint Systems.* Almost one-fourth of the text discusses surface preparation of steel. Lead Industries Association, 292 Madison Ave., New York 17, N. Y.

Intermetallic Semiconductors

A revised manual for the evaluation of III-V intermetallic semiconductors has been published by Monsanto Chemical. It describes the procedure for preparing single crystal, gallium arsenide for evaluation; the x-ray method for orienting gallium arsenide crystals; the procedure for evaluating Hall coefficient and resistivity of gallium arsenide, and the procedure for measuring dislocation density in gallium arsenide. Electronic Chemicals Dept., Inorganic Chemicals Div., Monsanto Chemical Co., 800 N. Lindbergh Blvd., St. Louis 66, Mo.

Brazing Stainless Steel

A brazing alloy selection chart contains data on the 300 and 400 series, Armco 17-7 PH, Armco PH 15-7Mo and AM-350 stainless steels. The chart lists the brazing alloys, fluxes, and atmospheres most suitable. Typical applications are cited. Included is information on compositions, melting, and flow points of alloys commonly used for brazing stainless. Handy & Harman, 850 Third Ave., New York 22, N. Y.

Welding Dos and Don'ts

Fourteen major tips for better welding, especially where precise highly reliable welds are required, are described and illustrated on a two color chart. The reverse carries a checklist for correcting unsatisfactory welds and provides aids in solving welding problems. Commercial Apparatus & Systems Div., Raytheon Co., 225 Crescent St., Waltham 54, Mass.

Welding Problems, Answers

The first 25 pages of a manual published by All-State consists of examples where specialty alloys have solved some difficult joining problems. Analyses of costs, time, and operating procedures are included. All-State Welding Alloys Co. Inc., 249-55 Ferris Ave., White Plains, N. Y.

Copper-Zirconium Alloy

A comprehensive survey of the properties of Amzirc, a copper-zirconium alloy developed to combine retention of high strength at elevated temperatures with high conductivity is contained in a 36 page handbook. Amco Sales Div., American Metal Climax Inc., 1270 Avenue of the Americas, New York 20, N. Y.

SHAPE
+
SLIDE
+
SAVINGS

This distributor cam once posed a materials selection problem for the Pinspotters Division of American Machine and Foundry—a problem solved by nonferrous powder metallurgy. As originally designed, the cam was machined from steel, but AMF was looking for increased slide characteristics to prevent the galling and binding which tended to occur with steel-to-steel contact.

Oil-impregnated prealloyed bronze powder provided the self-lubrication required—as well as fatigue strength of 5000 psi and ultimate tensile strength of 18,000 psi. And despite the tricky compacting technique called for by the continuously curved outer section, International Powder Metallurgy of Ridgway, Pennsylvania produces this more efficient redesign at a **90% cost saving.**

Lower cost, improved performance, solution of a tough design problem—these are the advantages to be gained through nonferrous powder metallurgy. To find out how to put this material and method to work for you, write today for your copy of "Designing for Pressed Brass and Nickel Silver Parts."

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WHO SAVES WITH THE A-L TOOL STEEL STEELECTOR SYSTEM?

EVERYBODY DOES!

If part of your job deals with tool steel, you can save time and make your work easier by using the Allegheny Ludlum STEELECTOR System. And you will be saving your company money. Check this list to see how the STEELECTOR Program can help you:

Owner, president, vice president Reduces costs in warehousing and purchasing. Insures selection of the right tool steel—prevents misapplication and wrong heat treatment.

Operating man, superintendent, foreman, production control man Ends availability problems. Large local warehouse stocks enable you to reduce your own stocks. Consistent high quality.

Engineer, metallurgist Speeds selection of the right tool steel—saves selection time for jobs that need it.

Specifier, designer, toolroom man Assures you of the availability of the size and grade you need. Only 18 grades to consider for 96 percent of all applications.

Stockroom supervisor Saves storage space because fewer grades are needed. Ordering, paper work are reduced.

Heat treater Helps you operate furnaces more profitably—more tools can be treated at a time.

Purchasing agent Reduces paperwork and inventory needs. Makes your job easier.

For more information ask your Allegheny Ludlum salesman for your copy of the colorful STEELECTOR Booklet, or write: ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. S-12.***

3242

STEELECTOR PROGRAM

Steel

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

AL

Output Reaches 20-Month High

CONTINUED strong demand for flat rolled products has boosted weekly steel production to the highest level in 20 months. It now looks like the year's output will be close to 98 million tons—about 1 per cent less than last year's.

Sheet producers are booking the biggest orders that they've seen since the spring of 1959. The upturn that started after Thanksgiving has lost some of its acceleration but none of its strength. Buying interest remains high as automakers, appliance manufacturers, and other users step up their consumption and prepare to build inventories during the first half of next year.

DELIVERIES STILL GOOD— Although sheet mills are booking as much tonnage per week as they could produce at capacity, they're not running full. That's because users don't want the steel they're ordering to be shipped until January or February. Deliveries are still prompt, but they'll start stretching out after the first of the year. By March, most sheet mills will be running at capacity. Although the industry undoubtedly has more capacity for sheets than it did in 1959, the possibility of spot shortages in the second quarter can't be ruled out. Cold rolled sheets, heavy plates, galvanized items, and tin plate may be hard to get if inventory building is accompanied by heavy consumption in the automotive, construction, and canmaking industries.

BARMAKERS NOTE PICKUP—The upturn that started in sheets is beginning to affect bars. They've been lagging for months, but producers are predicting that shipments will be up substantially in January. Automakers are ordering ahead for inventory purposes. Demand probably won't accelerate enough during the first quarter to tighten the market appreciably, but there's a possibility that order books will fill up by May. If any shortages develop, they'll most likely be in quality steels (such as hot topped grades), or in certain products made on the larger mills.

SMALLER BUILDUP IN PLATES?—If the 1959 buying pattern is repeated next year, the first strike hedge orders for plates will hit the mills by mid-January. Users who can forecast their long range requirements, such as tank fabricators and service centers, will start building inventories. Whether they'll try to accumulate as much surplus steel as they picked up in 1959 remains to be seen. Comments one plate producer: "After the last strike, we caught up in a hurry and shipped so fast that people started yelling uncle. Some of them are going to remember that. Maybe they'll feel safe with smaller inventories than they built last time."

GALVANIZED GAINING— This year's shipments of galvanized sheets will break the record of 3,056,996 tons set last year. Shipments through the first ten months of 1961 were 78,345 tons above those of the like period in 1960. Look for the yearend total to be about 3.3 million tons—the amount that STEEL predicted last summer (July 17, p. 155). Markets for the product have been widened by new developments in coating, welding, and painting, and the availability of wider stock. Automotive consumption is up substantially.

PRODUCTION RISING— Look for ingot production in the week ending Dec. 23 to be slightly higher than the 2,220,000 tons that STEEL estimates the industry poured in the week ended Dec. 16. Output then was 2.9 per cent above the previous week's.

WHERE TO FIND MARKETS & PRICES

	News	Prices
Bars, Merchant	172	178
Reinforcing	...	179
Boiler Tubes	...	183
Canada	...	186
Charts:		
Finished Steel	...	177
Ingot Rate	176	...
Scrap Prices	...	189
Clad Steel	...	184
Coal Chemicals	...	186
Coke	...	186
Comparisons	...	177
Contracts Placed	175	...
Contracts Pend.	175	...
Electrodes	...	*
Fasteners	...	183
Ferroalloys	...	187
Footnotes	...	183
High Strength Steels	173	...
Imported Steel	...	186
Ingot Production	176	...
Metal Powder	...	186
Nonferrous Met.	192	194

	News	Prices
Ores	172	186
Pig Iron	172	185
Piling	...	178
Plates	172	178
Plating Material	...	*
Prestressed Strand	...	183
Price Indexes	...	177
Producers' Key	179	...
R.R. Materials	...	183
Refractories	195	186
Scrap	189	190
Semifinished	...	178
Service Centers	173	185
Sheets	171	179
Silicon Steel	...	180
Stainless Steel	...	184
Steel Shipments	171	...
Strip	171	180
Structurals	175	178
Tin Mill Prod.	...	180
Tool Steel	195	184
Tubular Goods	173	184
Wire	171	180

*Current prices were published in the Dec. 11 issue and will appear in subsequent issues.

Here is a major breakthrough in sealing air cylinders...

the new IPC ArchSeal*

REQUIRES NO MECHANICAL ASSIST. It floats . . . it's revolutionary . . . it's so simple in design and so reliable in service you'll wonder how you ever got along without it! IPC's custom engineered ArchSeal is just what the name implies . . . an arched design with *flexing* sides.

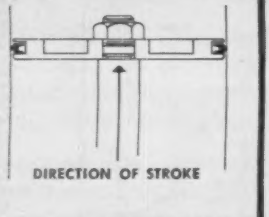
The far "leg" of this new seal moves *away* from the pressure source *instantly* . . . to provide positive sidewall sealing as the air medium flows around the non-contact leg and back-fills the hollow arch. Immediately . . . you get self compression on the *face* of the seal as the air pressure expands the face outward against either shaft or cylinder wall.

That's right! They're made for inside or outside sealing. Reverse the pressure or stroke . . . the seal reacts in the opposite direction with the same positive results!

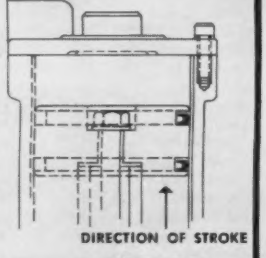
Reliability? Many are performing perfectly now with over 20,000,000 cycles. Temperature range? From minus 30° up to 500° F.

Here's the *ideal* seal for air cylinders where no lubrication is possible. Here's the way to eliminate expensive assembly components of O-rings, U's or V's with their expanders, back-up rings, or washers. You don't need them! The ArchSeal solves the problem without extra frills.

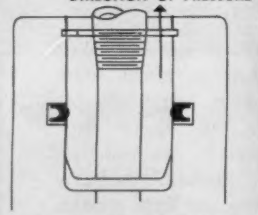
Oh yes . . . it's an IPC "custom" product so we'll need details on your application. Don't hold back . . . the ArchSeal can be the answer for which you have been looking.



CYLINDER APPLICATION
with ArchSeal mounted in piston. Note clearance in non-engaged "leg."



CYLINDER APPLICATION
with two ArchSeals.



SHAFT APPLICATION
Note positive seal on shaft face as medium flows behind non-engaged "leg" . . . fills arch . . . provides own compression

"OUTSIDE" CONFIGURATION

"INSIDE" CONFIGURATION

IPC

OIL SEALS
PACKINGS
PRECISION MOLDING *Custom designed for your application*

INTERNATIONAL PACKINGS CORPORATION

Bristol, New Hampshire

*Patents and Trademark applied for.

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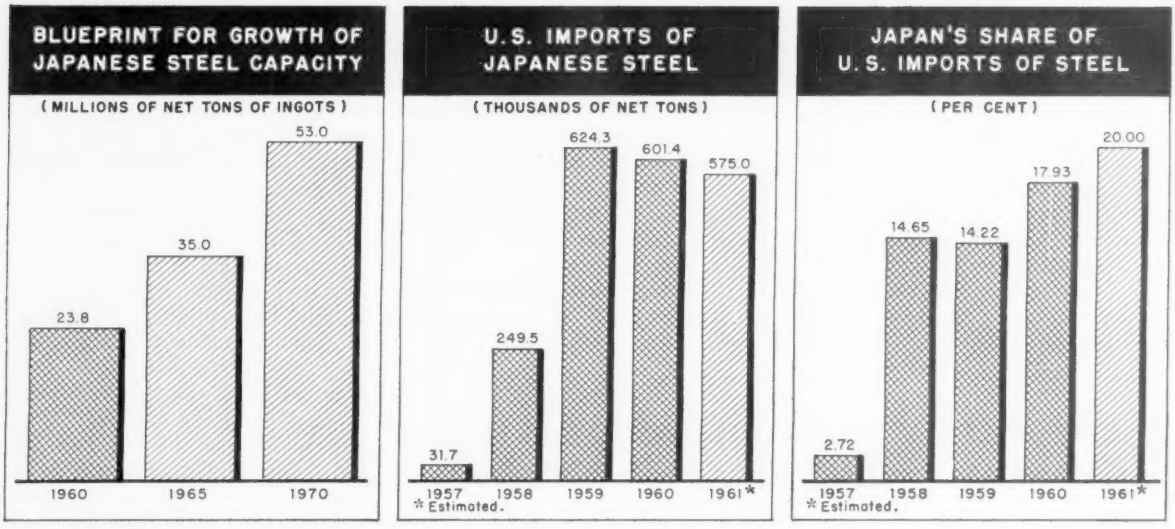
P6



More Japanese Steel in U. S. Future?

The answer could be "Yes." Japan's steelmaking capacity is slated by 1970 to be almost double what it is now, so you can expect more exports into this country if Japan's domestic markets don't grow proportionately

THE U. S.—already Japan's No. 1 market for steel exports—will probably be a prime target for increased amounts of steel and hard goods labeled "Made in Japan."

Reason: That country has embarked on an ambitious expansion program. It's shooting for twice as much steel capacity in 1970 as it had in 1960. Some people question whether Japan can use all that additional steel. They think the slack will be taken up by exports.

In 1960, Japan sent 23.2 per cent of its iron and steel exports to the U. S. Its second largest export market was India, which took 11.7 per cent.

• **Growing Bigger**—Japan is capturing an increasing share of the steel import business in the U. S. (see chart above), and is second only to Belgium-Luxembourg as a foreign supplier of steel to the U. S. (The table at the bottom of the page shows how it has moved up in rank.) The U. S. market is a prime target because of our high standard of living.

The expansion program is expected to provide a 1970 capacity of 53 million net tons of ingots compared with 23.8 million in 1960 (see chart above).

• **How It Ranks**—Japan was the world's fifth largest steel producer in 1960. It turned out around 23,880,000 net tons of ingots. Output in 1961 is expected to be 2 million or 3 million tons higher. It appears that the country will soon advance to third place among world steel producers—behind the U. S. and Russia.

The expansion program is part of the "Double Income" plan formulated by the Japanese government in late 1960. The aim is to increase the per capita income of Japanese citizens by fiscal 1970 to twice the 1960 figure.

• **Would Double Usage**—The plan

Japan Moves Up in Rank as a Steel Exporter to U. S.

	1957	1958	1959	1960	1961
1st	Belgium-Luxembourg	Belgium-Luxembourg	Belgium-Luxembourg	Belgium-Luxembourg	Belgium-Luxembourg
2nd	West Germany	**JAPAN**	West Germany	**JAPAN**	**JAPAN**
3rd	France	West Germany	**JAPAN**	West Germany	West Germany
4th	United Kingdom	France	France	France	France
5th	Canada	United Kingdom	Canada	United Kingdom	Canada
6th	**JAPAN**	The Netherlands	United Kingdom	Canada	United Kingdom

presumes that domestic consumption of steel will reach 970 lb of ingots per person compared with the present 450 lb. (U. S. per capita output averaged 1162 lb in the 1956-60 period.) Some observers think such a gain is impossible. The country has a relatively small domestic market for heavy consumer goods, so it has been suggested that a doubling of steel production could come about only through substantial increases in exports of manufactured products. But they would encounter increased competition from the expanding industries of other countries.

• **Product Mix** — It is anticipated that the Japanese demand for steel products will be apportioned like this in 1970: 28 per cent (vs. 25.4 in 1960) for sheets (including hoops, tin plate, galvanized sheets, and silicon sheets); 21 per cent (vs. 20.1 in 1960) for bars; and 14 per cent (vs. 13.4 in 1960) for shapes. Other 1960 figures: Wire rods, 8.5 per cent; plates, 22.8; steel pipe, 7.0; and others, 2.8.

• **How Much for Export**—In 1960, when Japan's steelmaking capacity was 23.8 million net tons, it exported 2,763,900 net tons of iron and steel.

One thing can be anticipated in 1970: The energetic Japanese can be counted upon to find outlets for any steel surplus. They will have at least two important advantages in winning markets: Their mills have new equipment, much of it from the U. S., and they are avidly engaged in product research. For example: Yawata Iron & Steel Co. Ltd., Japan's largest producer of steel, and its Technical Research Institute, have 700 people doing research. Fuji Iron & Steel Co. Ltd., second largest producer, has started work on a $9 million research center. Another factor: Labor costs in Japan are only about a seventh of what they are in the U. S.

• **57 Companies** — The large iron and steel producers of Japan are already vigorously selling in the U. S. They include (in descending order of size of steelmaking capacity): Yawata Iron & Steel Co. Ltd., Fuji Iron & Steel Co. Ltd., Nippon Kokan Kabushiki Kaisha, Kawasaki Steel Corp., Sumitomo Metal Industries Ltd., and Kobe Steel Works Ltd. In addition, 51 other makers of iron and steel are listed in the 1961 edition of "Japan's Iron & Steel Industry," published by Tokyo Foreign Service. Nine companies have around 75 per cent of the steelmaking capacity.

• **More Flat Rolled**—Although wire rods have topped the product list tonnagewise in Japanese exports to the U. S., we can expect increasing amounts of light, flat rolled products. The preponderance of Japan's new rolling mills are for flat rolled goods.

In the first nine months of 1961, Japan exceeded all countries in shipments to the U. S. in a number of categories—wire rods, round wire, wire nails and staples, telephone and telegraph wire, wire strand, baling wire, hot rolled alloy bars, cold finished carbon and alloy bars, black plate, plates, skelp, malleable cast iron pipe fittings, castings and forgings, and bolts, nuts, and rivets.

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...

Pat. No. 2,900,096

DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

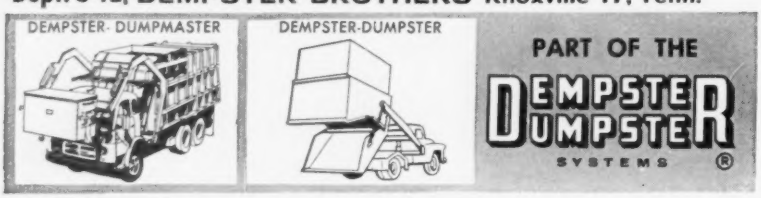
Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

Dept. S-12, DEMPSTER BROTHERS Knoxville 17, Tenn.



In the same period, Japan was second only to Canada in exports to the U. S. of hot rolled, cold rolled, and galvanized sheets.

• **More Competition Coming** — When foreign steel competition came in for discussion Nov. 29 at a Pittsburgh regional technical meeting of the American Iron & Steel Institute, D. R. Loughrey expressed belief that competition from Japanese steel will come in the form of goods manufactured from steel. Mr. Loughrey is consultant to the superintendent, Open Hearth Dept., Pittsburgh Works, Jones & Laughlin Steel Corp.

It is quite clear, he said, that Japan has only scratched the surface in exporting to the U. S. "Most of the competition from Japan is still 'in the hopper,' and will really pour out in the next five years."

The moral (from Mr. Loughrey): "Herein is a situation to which Americans should devote a lot of serious thought."

Steel Shipments Down in First Ten Months of '61

Shipments of finished steel products direct from the mills during the first ten months of this year totaled 54,578,772 net tons, reports the American Iron & Steel Institute. The total compares with 62,543,780 tons in the like period of 1960.

During October, 6,045,841 tons were moved vs. 6,057,705 in September (4,943,623 in October, 1960).

The principal groups receiving mill shipments in the ten month period this year compared with a year ago were:

Classification	1961 (Tons)	1960 (Tons)
Warehouses	10,214,305	11,050,398
Automotive	9,896,178	12,721,659
Construction	7,947,292	8,483,902
Containers	5,789,170	5,791,950
Contractors' Products	3,265,099	3,178,673

The chief products shipped during the first ten months this year compared with shipments in the like 1960 period were:

Products	1961 (Net tons)	1960 (Net tons)
CR Sheets	9,697,836	12,697,010
HR Sheets	5,695,411	7,048,706
HR Bars	5,193,464	6,061,403
Plates	4,751,472	5,368,582
Elec. Tin Plate	4,664,102	4,579,097

Wire . . .

Wire Prices, Pages 180 & 183

Wire and wire products are moving at a faster rate. Consumers are beginning to build inventories. In the Midwest, buyers are ordering about 10 per cent larger tonnage than they need for current requirements.

Sheets, Strip . . .

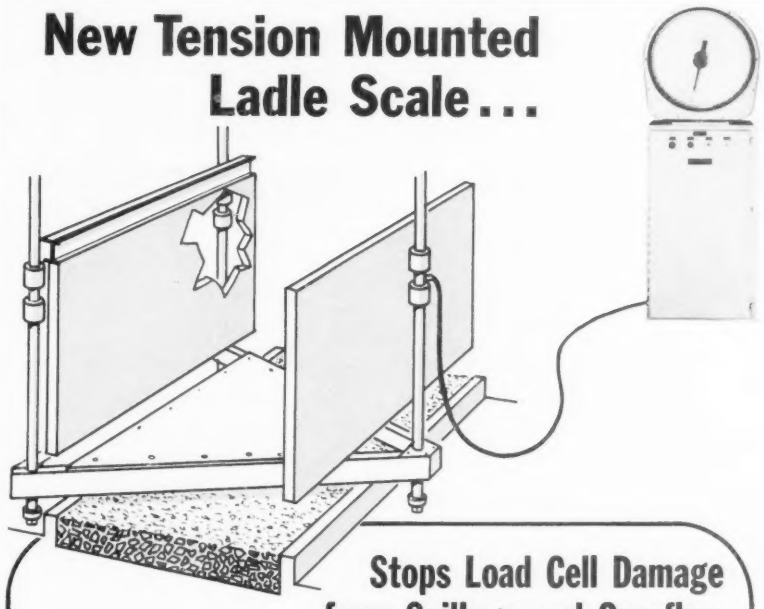
Sheet & Strip Prices, Pages 179 & 180

Although deliveries haven't noticeably tightened yet, demand for hot and cold rolled sheets is expanding rapidly, particularly on automotive account. Hot rolled sheets are still available in two to three weeks, and cold rolled in two to five.

Most producers of galvanized sheets are booked up through January, in some cases into February. Few sheet specialties are available for delivery next month.

Flat products in most active demand at present are galvanized sheets, long ternes, tin plate, and large plates. However, hot rolled and cold rolled sheets are moving up

New Tension Mounted Ladle Scale...



Stops Load Cell Damage from Spillage and Overflow

This new Gilmore electronic ladle scale has just been installed by a major Western steel producer. Load cells are tension mounted at the top of the pit and protected with a steel plate (see diagram). Unlike the conventional compression mounted cells, they can't be damaged by spillage or overflow from molten steel.

A similar Gilmore scale, installed at Republic Steel's open hearth furnace in Cleveland in 1952, has operated continuously for over 9 years without major repair requirements.

A crane lowers the empty ladle on to a weigh bridge supported by three tension-mounted electric load cells. Ladle is filled with hot metal from a bottle car and load indicated on a 20" circular scale located in a scale house. Simultaneously, two remote printers record weight on a punched tape for tabulating purposes. The remote weighing indicator lets operator control the fill operation and still be away from the high heat source. Scale has a total weighing capacity of 250,000 lbs. of live load and reads out with an accuracy of ±¼%.

GILMORE INDUSTRIES, INC.

3355 Richmond Road • Cleveland 22, Ohio

West Coast Sales & Service Office: 2550 East Foothill • Pasadena, Calif.
East Coast Sales & Service Office: Box 531 • Media Pa.

fast, strongest markets being in automobiles and appliances. Demand from both those areas of consumption is expected to accelerate markedly during first quarter as steps are taken to build inventories against a possible midyear steel strike.

Steel Bars . . .

Bar Prices, Page 178

Demand for commercial steel bars is picking up as consumers begin to show concern over inventories. They're buying for prompt and early future needs and accumulating stocks as a hedge against a possible midyear steel strike.

Some mills report orders are the heaviest they've booked in months. Deliveries, in the main, are being specified for January-February. Buying is more diversified than it has been in the last few months.

Despite the improvement in orders, mill deliveries have not tightened noticeably.

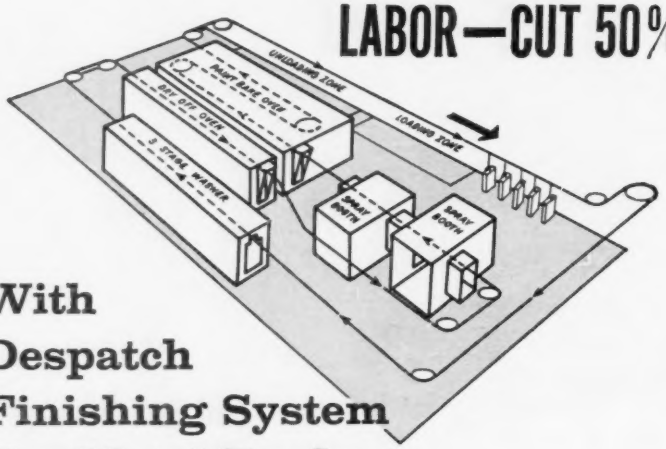
Plates . . .

Plate Prices, Page 178

Sheared plates are moving a little faster, and consumers are beginning to show interest in forward requirements. Fabricators are covering their needs for contracts in hand, but more tonnage is being estimated for heavy weldments. Orders for the latter, which include a higher ratio of alloy and high tensile grades than usual, will not be released until early next year.

In general, deliveries running two to three weeks are unchanged from schedules prevailing recently. Alloys and plate specialties can be had in four to five weeks.

PRODUCTION—UP 300%
COSTS—DOWN 67%
LABOR—CUT 50%

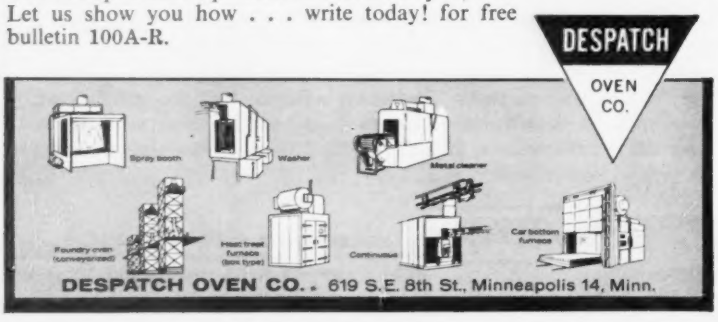


With Despatch Finishing System For Metal Products

The figures speak for themselves. Hoffman Engineering Corp., Anoka, Minn., reports that savings in production and labor costs alone paid for its complete new Despatch finishing system in only two years. And production was boosted 300% in the bargain.

The conveyorized system, designed and installed by Despatch engineers, not only produced these remarkable improvements but is capable of easy expansion in the future to match the company's growth.

Despatch's years of experience and imaginative engineering have produced solid results for this Minnesota firm and thousands of others. You can put these qualities to work for you, too. Let us show you how . . . write today! for free bulletin 100A-R.



DESPATCH—INDUSTRY LEADERS FOR 58 YEARS

Iron Ore Imports Are Off Sharply from 1960 Volume

Imports of iron ore for consumption this year are substantially under the tonnage that came into the U. S. in 1960. Latest available government data show total imports for the first nine months of this year amounted to only 18,549,515 long tons, valued at $180,488,538. That compares with 28,472,954 tons, valued at $264,984,129, imported in the like period of last year.

September imports this year amounted to 2,564,365 tons, valued at $24,879,718. In the same month of 1960, a total of 3,069,145 tons, valued at $29,308,757, was brought in.

Iron Ore Imports
(Gross Tons)

Source	First 9 Months 1961	First 9 Months 1960
Brazil	549,769	1,143,713
British W. Africa	.....	35,180
Canada	6,907,582	9,174,550
Chile	1,613,384	3,055,749
Cuba	.....	2,820
Denmark	298	468
Iran	.....	1,968
India	23	.....
West Africa	.....	5,672
Liberia	518,778	711,291
Mexico	92,234	127,783
Peru	895,241	2,493,740
Philippines	.....	1,000
Portuguese Asia	.....	56,900
Sweden	59,163	66,301
Spain	100	180
Union of S. Africa	23,080	.....
United Kingdom	2,116	148
Venezuela	7,887,747	11,595,491
Totals	18,549,515	28,472,954

Pig Iron . . .

Pig Iron Prices, Page 185

Movement of merchant pig iron is seasonally slow. Shipping of iron by lake vessel out of Buffalo has been halted until spring and shipments to foundries are restricted by their desire to keep inventories low for tax purposes.

Most trade leaders look for im-

proved foundry buying in first quarter. Producers are gradually reactivating furnaces in anticipation of larger business. U. S. Steel Corp., for instance, has placed another blast furnace in operation at its Edgar Thomson Works, Braddock, Pa.

Steel Order Rush Pushes Production and Shipments

Orders for steel products are being placed on mill books at such a rate it is now a virtual certainty that December production and shipments will top the showing in November. In the Midwest, some steel sellers think there may not be a severe yearend dip in ordering. At the rate orders are coming in, they say, January is certain to eclipse December in production and shipments.

Two main reasons are given for the mushrooming of activity in the markets: 1. Hedge buying prompted by the fear of a midyear steel strike. 2. The automotive industry, in addition to hedge buying, is asking for more steel to support current heavier December assembly schedules.

Distributors . . .

Prices, Page 185

Volume of business being booked by steel service centers is light due mainly to seasonal influences. Demand is expected to improve early in January, but may not spurt until the latter part of the first quarter.

Distributors in Western Washington are protesting a freight differential of $2.20 a ton. It is pointed out that distributors shipping to Alaska are under a disadvantage in meeting prices quoted from Portland, Oreg. Among the exhibits at the Seattle hearing was one showing sharply increased trucking movement from Geneva, Utah, to Puget Sound.

Tubular Goods . . .

Tubular Goods Prices, Page 184

Shipments of oil country goods this month are running a little ahead of those in November, and producers are optimistic about prospects for the first quarter of 1962. Major oil companies are talking about buying enough steel in the first six months next year to last them nine months. However, they haven't started building inventories. They're not under pressure to do so because they're aware that the tubemakers have huge supplies at downriver terminals.

The Hughes Tool Co.'s latest survey shows an upswing in active rotary oil drilling rigs. In the week ended Dec. 4 there were 1964 rigs operating in the U. S., up 73 from the week before, while Canada had 145 active rigs, up 9.

Grade Extras Established On High Strength Steels

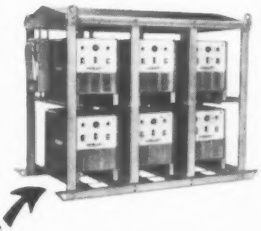
A new marketing program for high strength steels announced last week by U. S. Steel Corp., Pittsburgh, recognizes the increasing importance of that family of steels, integrating identification and pricing of the group.

A new price list for high strength steels is being distributed. It includes information to aid engineers,

Model RL-314-S

New "LOWBOY" welder is packed with PRODUCTION IMPROVING FEATURES

Unitrol—exclusive single dial controls wider current range than any other welder of its size • Entire range can be remotely controlled • Silicon rectifiers are permanently sealed for superior corrosion resistance, long trouble-free life • Supplies 110v. AC power for hand tools • Can also be used for cutting, gouging • Available in 300 and 400 ampere models.



CONSTRUCTION CONTRACTORS: Look how compactly six "Lowboys" can be stacked and moved as a unit. Only one connection puts all six welders into operation.

HOBART BROTHERS COMPANY, BOX ST-121, TROY, OHIO

"Manufacturers of the world's most complete line of arc welding equipment"

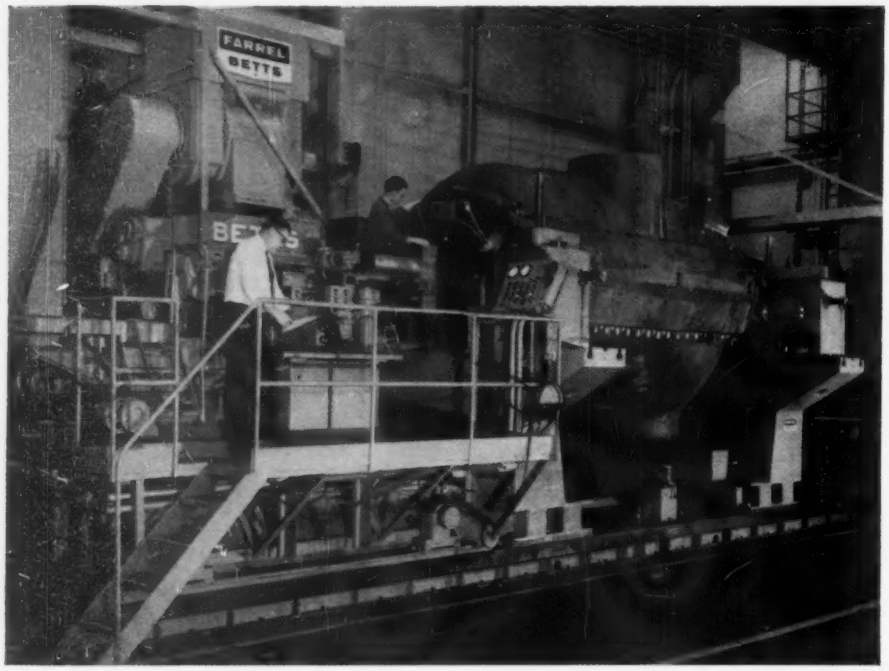


Photo taken at the G.E., Large Steam Turbine Dept., Schenectady, N. Y., shows a closed-end turbine shell in place on the work-support pedestals. Stub bar and double-slide tool head are in position to bore and face one end. The opposite end can be machined with the same bar and head by transferring the entire spindle-head unit to the opposite end of the bed.

new, faster way to bore and face ends... plus the inside...of large workpieces

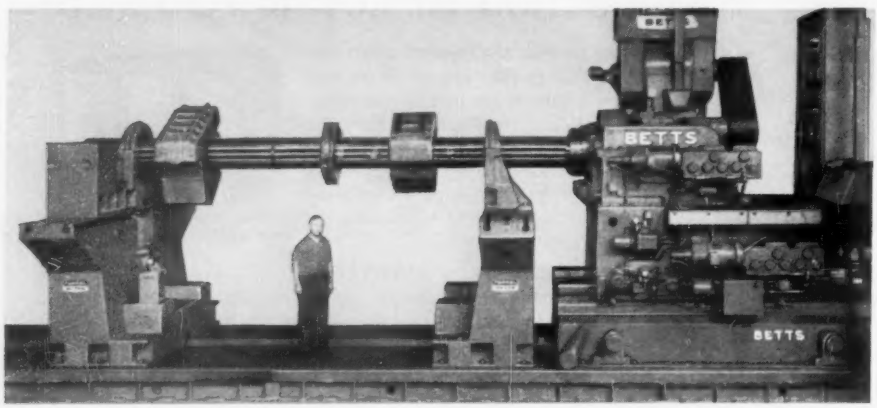
With the installation of a newly designed Farrel-Betts horizontal boring machine, General Electric Company's, Large Steam Turbine-Generator Department at Schenectady, New York, has reduced by about 60% the floor-to-floor time formerly required to bore and face closed and open-end turbine high-pressure shells. Time is saved in both machining and setup.

Until recently, turbine shells were machined on vertical boring mills or horizontal bar-type machines. Neither type was geared or powered for carbide cutting tools. And, setup operations for both were complex and time consuming.

The new method was evolved through collaboration between Consolidated and General Electric engineers. The machine is operated horizontally with carbide tools rotating within the workpiece at optimum speeds. The depth of cuts are in excess of ½ inch at approximately .025 feed, utilizing G. E. carboloy single-point regrindables and brazed-on bits. The design of the machine permits the interchangeable use of stub bars (for closed ends) and a through bar (for inner fits and open ends). Each bar is provided with a suitable boring and facing head and arranged so that the driving member can be transferred from one end of the workpiece to the other. Tool position is displayed at the operator's station.

This is another example of how Consolidated solved a special production problem. In addition to building machines for particular applications, Consolidated offers a standard line of bar-type horizontal boring machines and vertical boring mills.

FARREL-BIRMINGHAM COMPANY, INC.
CONSOLIDATED MACHINE TOOL DIVISION
565 Blossom Road • Rochester 10, N. Y.
Telephone: BUtler 8-4600
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.



FARREL
BETTS

Machine set up with through bar in place. Bar is supported at each end by antifriction bearing-bar supports mounted on pedestals and, inside the workpiece, by similar supports held by adjustable supports against the wall of the workpiece.

CM-67

designers, fabricators, manufacturers, and consumers in determining combination of economic and physical characteristics best suited to the end-product planned.

Tradenames are retained. In addition, the grades are separated into six categories of identified strength levels, resistance to corrosion, and other mechanical and physical property characteristics.

In the new schedules, price bases heretofore quoted by individual product and tradename are withdrawn, and grade extras are published as an additive to the appropriate price base for the carbon steel product. These new grade extras, effective Dec. 12, reflect both increases and decreases in the former prices of individual products, but the general price level of the high strength steels remains about the same. The new grade extras are shown above.

GRADE EXTRAS FOR HIGH STRENGTH STEELS
(Cents per pound added to carbon base)

Grade	HR Plates	Floor Plates	HR Shapes	HR Bars	HR Strip	HR Sheets	CR Sheets	Galvanized Sheets
Cor-Ten	2.50	2.50	2.50	2.50	2.50	2.50	3.00	3.00
Tri-Ten	1.90	1.90	1.90	1.90	1.90	1.90	...	...
Man-Ten	1.15	1.15	1.15	1.15	1.15	1.15	...	...
Par-Ten	...	...	...	...	...	1.90	2.275	...
Ex-Ten 60	1.40	...	...	...	1.75	1.75	...	...
Ex-Ten 55	1.05	...	...	...	1.40	1.40	...	...
Ex-Ten 50	0.70	...	0.70	1.05	1.05	1.05	1.275	...
Ex-Ten 45	0.55	...	0.55	0.90	0.90	0.90	1.075	1.075
Abrasion Resisting	1.75	1.75	...	1.875	1.775	1.775	...	...

Structural Shapes . . .

Structural Shape Prices, Page 178

The seasonal sag in construction is reflected in a slackening of inquiry and a slowing down in fieldwork.

Fabricators are not particularly concerned about steel supplies—at least they aren't showing any great anxiety over inventories while mill shipments, on the average, are still readily available in two to three weeks.

On the West Coast, commercial construction is reported bolstering demand for fabricated structurals. Several tonnages are expected to be placed shortly in the Pacific Northwest, including 700 tons for a structure for Boeing Co. at Renton, Wash., and 3000 tons of transmission tower steel for the Bonneville Power Administration. Fabricators in the area are encouraged by the number of new projects that have come out for figuring.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

500 tons, repairs to Magnolia Bridge, Seattle, to Isaacson Iron Works, Seattle; S. S. Mullen Inc., Seattle, general contractor.

260 tons, Swedish Hospital addition, Seattle, to Isaacson Iron Works, Seattle; John H. Sellen Construction Co., Seattle, general contractor.

175 tons, wide flange, Navy, Military Industrial Supply Agency, Philadelphia, to Ziegler Steel Service Corp., Los Angeles.

155 tons, state highway bridge, Proj. 68-74, Killingly, Conn., to City Iron Works, Hartford, Conn., Enfield Road Construction Co., Enfield, Conn., general contractor.

STRUCTURAL STEEL PENDING

3028 tons, six span bridge, Project 63-137, Hartford, Conn.; Della Bitta-Bassola Inc., Milldale, Conn., low on general contract; also 757 tons of deformed steel bars, and 734 tons of steel piles are required.

2000 tons, Oregon State, 1500 ft span, John Day River; Pacific Concrete Co., Otis P. Jordan Jr., and C. Vernon Glidden, Portland, Oreg., joint low at $2,433,333 base.

1307 tons, nine span, composite rolled beam bridge, Hartford, Conn., Proj. 63-159; bids Jan. 2 to Hartford.

711 tons, three, two span, rolled beam bridges and two, single span, rigid frame bridges, Hartford, Conn.; Savin Bros. Inc., Bloomfield, Conn., low on general contract; also required, 957 tons of steel piles, 250 tons of sheet piles, 1509 tons of deformed steel bars, and 145 tons of mat reinforcing.

700 tons, Boeing Co. building, Renton, Wash.; bids in.

200 tons, Cougar Dam powerhouse, Oregon; S.S. & Co. Inc. and Western Electric Co., Seattle, joint low on rebid, $1,362,688 to the U. S. Engineer, Portland, Oreg.

190 tons, bridge and highway structures, Waterford, Conn.; bids Jan. 3 to Hartford, Conn.; also required, 73 tons of structurals and 31 tons of steel piles.

174 tons, bridge, Hampden-Hermon, Maine; bids Dec. 20 to Augusta, Maine; also required, 54 tons of reinforcing steel.

Steel Production Is Down Only 5.3% from Year Ago

Production of ingots and steel for castings in November totaled 8,749,000 net tons, bringing output for the 11 months of 1961 to 88,448,572 tons, reports the American Iron & Steel Institute.

November output was almost 42 per cent greater than the 6,171,940 tons poured in the like month of 1960, but was some 424,000 tons lower than the 9,173,170 tons produced in the immediately preceding

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SPECIAL METALS...

SPECIAL !! RUSH!

Ulbrich Stainless is precision rolled to close tolerances on Sendzimir Mills such as the one pictured here in operation.

Ferrous, nickel and super alloys plus special metals in coil form are all stocked in quantity at Ulbrich. Coils in gauges down to .001 all tempers and other specific requirements. Weights from 1 ounce to 2,000 pounds or more. Write for complete Ulbrich stock list on special metals and super alloys plus stainless steel strip.

Contact your local stainless steel service center for Ulbrich fast service and delivery.

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month, October, 1961. Much of the decline from October was due to the shorter month.

Raw steel production in the first 11 months this year was 5.3 per cent below the 93,441,760 tons poured in the like period of 1960. However, at the half-year mark, output had been 26 per cent below that in the first half of last year.

Steel Ingot Production Rises to 20 Month High

STEELMAKING operations have risen to the highest level since April, 1960. Mill operators will boost production still higher in the weeks ahead to meet growing demand for finished products — although the upswing will be temporarily checked during the yearend holidays. STEEL estimates ingot output for the week ended Dec. 16 at 2,200,000 tons, a gain of 2.9 per cent over the previous week's total.

• **Philadelphia** — Despite the approach of the holidays, steel demand continues to expand. Most improvement is in sheets for the automotive and household appliance industries. The AISI index of ingot production rose to 113 for the week ended Dec. 9 and was expected to rise moderately in the week ended Dec. 16.

• **Buffalo**—Steel production scored a sharp rise in this district for week ended Dec. 16. Bethlehem Steel relighted three units and is using 20 of its 35 furnaces. Republic Steel added one and is working five of nine units. Wickwire Spencer Steel added one and is operating two of three. Unconfirmed reports indicate that Bethlehem may relight its No. 1 open hearth shop which is used only during periods of strong demand.

• **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta area of the Southern district rose about 10 points during the week ended Dec. 16 to 74 per cent of 1960 capacity. Two major producers raised their operating rates in response to an increase in orders.

• **Los Angeles**—The ingot operating rate rose 3 points for the week ended Dec. 16 to an estimated 81 per cent of 1960 capacity.

• **Detroit** — Ingot production here continued at virtually the same pace for the week ended Dec. 16 as in the previous week. Routine maintenance work kept a couple of the district's furnaces down, lowering output slightly.

• **Youngstown**—Although the district's operating rate declined about 1 point during the week ended Dec. 16 to 60 per cent of 1960 capacity, producers report a sharp upturn in new business, especially for January delivery. Sharon Steel Corp. took off one open hearth. Youngstown Sheet & Tube Co.'s cold rolling department at Campbell Works is working at near capacity, and its hot strip mill is running at a high rate. The company also is accumulating steel for oil country goods to be shipped early next year.

• **Chicago**—Steelmaking was scheduled to rise 4 points for the week ended Dec. 16 to 84 per cent of 1960 capacity. The sharp upturn reflects the impact of the flood of orders which the mills began receiving in late November and which are still increasing.

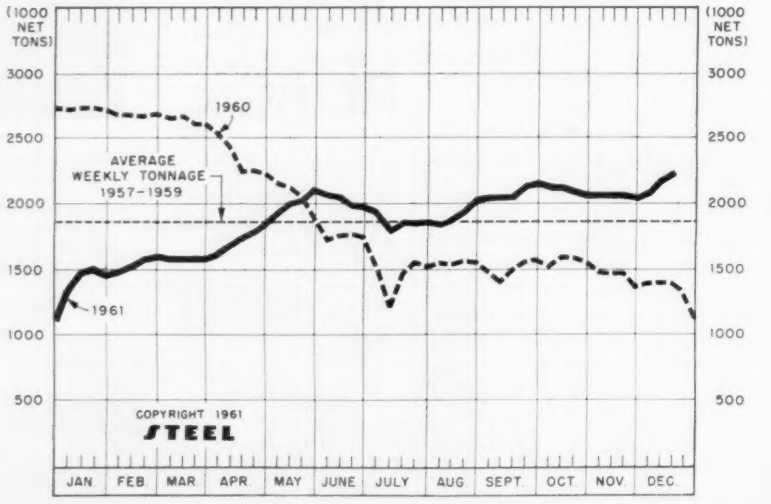
• **Pittsburgh** — District steelmaking operations advanced 1 point to 72.5 per cent of 1960 capacity in the week ended Dec. 16. An 8000 ton increase in production during the week ended Dec. 9 resulted in part from U. S. Steel Corp.'s reactivating two open hearths at its Edgar Thomson Works.

STEEL INGOT PRODUCTION

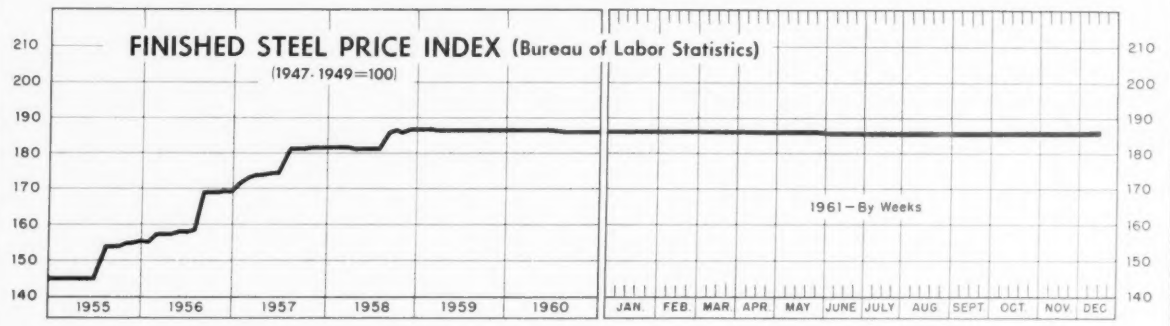
Weeks Ended	Net Tons	Change
Dec. 16	2,220,000*	+ 2.9%
Dec. 9	2,158,000	+ 4.1%
Dec. 2	2,073,000	+ 2.0%
Totals to Dec. 9		
1961	91,111,000	— 3.7%
1960	94,598,000	

DISTRICTS	Week Ended Dec. 9 Tons‡	Week Ended Dec. 9 Index†	Week Ended Dec. 2 Index†
Northeastern	301,931	113	107
Buffalo	110,011	113	102
Pittsburgh	423,726	105	103
Youngstown	166,581	98	94
Cleveland	112,040	121	105
Detroit	165,769	158	155
Chicago	471,336	126	119
Cincinnati	101,797	135	133
St. Louis	64,111	122	135
Southern	113,816	105	103
Western	126,266	108	108
Industry	2,158,000	115.8	111.3

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Dec. 12, 1961	Week Ago	Month Ago	Nov. Index	Year Ago
185.4	**185.4**	**185.4**	**185.4**	**186.2**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 12

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	(N.A.)
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.643
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.460
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv. Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.423
		Casing, Oil Well, Carbon (100 ft)	193.028
		Casing, Oil Well, Alloy (100 ft)	302.645
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, 8d Common (50 lb)	4.715
		Wire, Barbed (80-rod spool)	8.416
		Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED STEEL PRICE INDEX

	Dec 13 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	225.92
Index in cents per lb	6.713	6.713	6.713	6.713	6.111

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.66
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	34.33	34.33	33.00	28.67	65.50

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 13 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.98	5.35
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5 745	5.745	5.745	5.745	5.40
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.20
Tin Plate (1.50 lb)box,Pitts.	$10.65	$10.65	$10.65	$10.65	$9.95
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, $\frac{7}{32}$-$\frac{5}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Dec. 13 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.18	66.26
No. 2 Fdry, Nevilleisland,Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Frdy, Chicago	66 50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.68	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry(Birm.),deld.,Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	235.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$35.50	$35.50	$33.50	$26.50	$66.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	34.00	63.00
No. 1 Heavy Melt, Chicago	33.50	33.50	31.50	25.50	67.00
No. 1 Heavy Melt, Valley	36.50	36.50	33.50	26.50	66.50
No. 1 Heavy Melt, Cleve.	33.50	33.50	30.50	23.50	65.00
No. 1 Heavy Melt, Buffalo	27.50	27.50	29.50	23.50	62.50
Rails ,Rerolling, Chicago	58.50	58.50	57.50	46.50	93.50
No. 1 Cast, Chicago	41.50	41.50	39.50	36.50	50.50
COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32 00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices reported to STEEL, Dec. 12, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 179; footnotes page 183.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 ....$76.00

INGOT, Alloy (NT)

Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 ..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ...119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2 .119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 ....140.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2,W14 .122.50
S.Duquesne,Pa. U5 ....122.50
Warren,O. C17 ....122.50

SKELP

Aliquippa,Pa. J5 ....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
N.Tonawanda S47 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1 5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Struthers,O. Y1 ....5.50
Torrance, Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange

Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B3 ..5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N5 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ...5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. P4 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1 5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B2 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2...5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. P4 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1...8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 ....7.625
Warren,Ohio R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Claymont,Del. P4 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ...7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2...7.50
Youngstown Y1 ....7.50

PLATES, Ingot Iron

Ashland c.l. (15) A10...5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

FLOOR PLATES

Cleveland J5 ....6.375
Claymont,Del. P4 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P22 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
N.Tonawanda S47 ....5.675
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle(9) B3, N15 ....6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9)N15 ..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 ..6.375
Warren,O. C17 ....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
N. Tonawanda S47 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Seattle(6) B3 ....7.825
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H. R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ...8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 ....7.925
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2...5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12...5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon

LosAngeles P2, S30...11.75*

Alloy

Ambridge,Pa. W18....10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 ....8.10
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5....7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2...7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4...7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 ....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit H5, S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025

Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 ..... 9.20
N.Tonawanda S47 .....9.025
Plymouth,Mich. P5 ....9.225
S.Chicago, Ill. W14 ....9.025
SpringCity,Pa. K3 .... 9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 ..... 5.00
Birmingham C15 ..... 5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
Seattle B3, N14 .....6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Williamsport,Pa. S19 ...5.75

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2....7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle B3, N14 .....7.95
Williamsport,Pa. S19 ..7.00
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(Dir.Rolled) L513.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4) (44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 .....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ...5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ...5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10.... 5.35
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 ..... 7.05
Middletown,O. A10 ....6.775
Warren,O. R2 ..... 7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. P4 ..6.275
Fontana, Calif. K1 .... 7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ....7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.125	7.375
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	7.125	7.375
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.225	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.375

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10..7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10(type 1) 9.525
Butler,Pa. A10(type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 .....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Branford Machine & Mfg.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman & Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P10 Precision Strip Mill Div., Solar Steel Corp.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Div., Roblin-Seaway Industries

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Cold Drawn Steel Div., Standard Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L7 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 .....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 .....7.575
S.SanFrancisco(25) B3 .8.325
SparrowsPoint,Md. B2 ..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 .....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10 7.875
NewBritain,Conn. S15..7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Riverdale,Ill. A1 .....7.425
RiverRouge,Mich. P16..7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 .....7.425
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 ...7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4 M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N2	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
RiverRouge,Mich. P10	9.05	10.50	12.70	....	....
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria,O. S1	...	...	19.05	22.15	....
FranklinPark,Ill. T6	...	...	19.20	23.30	28.15
Harrison,N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer,Mass. W12	...	...	18.85	....	....
Trenton,N.J. R5	...	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....4.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 ....7.425*
Warren,O. B9, S3, T5..7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41 .....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
GraniteCity,Ill. G4	....	....	....	6.65
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irwin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt)	0.25 lb Coating
Aliquippa,Pa. J5	$9.10
Fairfield,Ala. T2	9.10
Fairless,Pa. U5	9.10
Fontana,Calif. K1	9.75
Gary,Ind. U5	9.10
GraniteCity,Ill. G4	9.20
Ind.Harb.,Ind. I-2, Y1	9.10
Irvin,Pa. U5	9.10
Niles,O. R2	9.10
Pittsburg,Calif. C11	9.75
SparrowsPt.,Md. B2	9.10
Weirton,W.Va. W6	9.10
Yorkville,O. W10	9.10

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.20
Fairless,Pa. U5 .....8.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 ....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 ....8.20
Yorkville,O. W10 .....8.20

ELECTRO. TIN-COATED SHEET (20-27 gage; per 100 lb)	(21-27 gage; per 100 lb)
IndianaHarb.,Ind. Y1	$7.90
Aliquippa,Pa. J5	$7.90
Niles,O. R2	7.90

TIN PLATE, HOT DIPPED COMMON COKE	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

HOLLOWARE ENAMELING (Black plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.375*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.375*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16 ..8.00
N.Tonawanda S47 .....8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00
Buffalo S47 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2..12.65
KansasCity,Mo. U3 ....12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16 .12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.075
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ..10.075
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.20
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.20
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.20
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 .....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 .....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE	(A)
Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S41	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

Photo Courtesy Butler Mfg. Co., Galesburg, Illinois

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING . . . P&H!

IN METAL FABRICATION . . . One man in the cab of this P&H overhead crane keeps several slitting and roll-forming machines supplied with coils of metal for continuous production. In addition, he spots incoming coils in proper storage areas as they arrive from the mills.

This manufacturer gets full use of plant floor area by moving materials through the air. The P&H crane and special coil-handling hook eliminates the "dead" aisle space needed with floor-operated equipment. It also saves manpower, and the safe, precision handling reduces damage to finished stock.

As with every Harnischfeger installation, this long-span (87') crane is specially engineered to consider all factors that may affect operation on this particular job. Special problems are taken in stride, integrated into the overall design. Only this kind of integrated engineering can give you performance that's never in doubt, performance P&H crane users have relied on for over 76 years!

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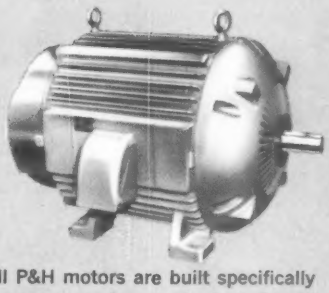

All P&H motors are built specifically for crane service — not adapted to it! P&H engineers have designed extra ruggedness into every part for maximum efficiency under the most severe conditions of fast acceleration, frequent reversals, and repeated shock loads. Thousands of P&H crane motors in every-day use prove that they give years of trouble-free service with minimum maintenance.

Offices in major cities . . . see Yellow Pages

HARNISCHFEGER
Milwaukee 46, Wisconsin

P&H
OVERHEAD CRANES

AIRCRAFT PARTS –

HANDLE WITH CARE!

Photo courtesy Northwest Orient Airlines, St. Paul, Minnesota.

Part for part, one of today's turbo-prop or pure jet transports represents an investment that would have bought an entire fleet of planes a few years ago. Overhaul and maintenance procedures for these planes include extra-careful, jet-age methods for quick, safe, reliable handling of every airframe or power-plant part.

Northwest Orient Airlines' new maintenance center is equipped with P&H Balanced Design Hevi-Lift hoists in every department. These hoists provide the right combination of smooth lifting power plus precision spotting control to handle aircraft components with maximum care and minimum effort.

What's more, every P&H hoist in this most modern shop is equipped with the new P&H Pull-A-Hoist — a separate motor-driven tractor unit that provides smooth rolling power and precision positioning of each hoist at the touch of a button. No more lost time tugging or lugging of parts for Northwest's busy mechanics and maintenance specialists!

Bulletin H-63 gives you the complete data about the P&H Pull-A-Hoist — America's newest, most efficient hoist-tractor. Write Dept. 229, Harnischfeger Corp., Milwaukee 46, Wisconsin, today!

HARNISCHFEGER

Milwaukee 46, Wisconsin

P&H
ELECTRIC HOISTS

Offices in major cities. see Yellow Pages

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N16	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.20
SparrowsPt.,Md. B2	8.88
Sterling,Ill. (37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	9.50
SparowsPt.,Md. B2	9.16
Sterling,Ill. (37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	9.55
SparrowsPt.,Md. B2	9.21
Sterling,Ill. (37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill. (7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill. (7) N15	198

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa.	J5..17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80†‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80†‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'im'r,Mass.W12	19.10	19.70†
Pitts.Calif.	C11	18.20 19.75†
S.SanFran.C10	18.20	19.75**
SparrowsPt.	B2	17.95 19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga.	J5 190§
Atlanta A11	191*
Bartonville,Ill. K4	192
Crawfordsville,Ind.	M8..192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
S.Chicago,Ill. R2	187**
Sterling,Ill. (7) N15	192

WIRE, Merchant Quality

	6 to 8 gage	An'ld	Galv.
Ala.City,Ala.	R2	9.00	9.55**
Aliquippa	J5	8.65	9.325§
Atlanta(48)	A11	9.00	9.75*
Bartonville(48)	K4	9.10	9.80
Buffalo	W12	9.00	9.55†
Chicago	W13	9.00	9.55**
Cleveland	A7	9.00	....
CrawfordsvilleM8		9.10	9.80††
Donora,Pa.	A7	9.00	9.55†
Duluth	A7	9.00	9.55†
Fairfield	T2	9.00	9.55
Houston(48)	S5	9.25	9.80**
Jack'vill.,Fla.	M8	9.10	9.80‡‡
Johnstown(48)	B2	9.00	9.675§
Joliet,Ill.	A7	9.00	9.55†
KansasCity(48)	S5	9.25	9.80**
Kokomo(48)	S16	9.10	9.65†
LosAngeles	B3	9.95	10.625§
Minnequa	C10	9.25	9.80**
Monessen(48)	P7	8.65	9.35§
Palmer,Mass.	W12	9.30	9.85†
Pitts.,Calif.	C11	9.95	10.50†
S.SanFran.	C10	9.95	10.50**
S.Chicago	R2	9.00	9.55**
Spar'wsPt.(48)	B2	9.10	9.775§
St'ling(37)(48)	N15	9.10	9.80
Struthers,O.	Y1	9.00	9.65‡
Worcester,Mass.	A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.: Base, one keg .... 43.00; 20,000 lb or more .. 53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and setscrews apply only to products ordered in these minimum quantities: ¼ in. through ⅜ in. diameter, 15,000 pieces; ⅞ in. through ⅝ in. diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85 7/16 in. and smaller by 6 in. and shorter, 11% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.725
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanan,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Shaered; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	41.50	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	50.00	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; Branford Machine & Mfg. Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4, stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Minimum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
NorthTonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	78.11	78.61	79.11	....
Rochester, N.Y., deld.	69.87	70.37	70.87	....
Syracuse, N.Y., deld.	71.22	71.72	72.22	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
SouthChicago, Ill. R2	66.00	66.50	66.50	67.00
SouthChicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland A7, R2	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.60%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.45% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa, Open-hearth & Fdry, K2	89.00
Keokuk, Iowa, O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.25	10.26	10.06	8.85	9.05	11.70	16.38	8.85	8.70	10.55
Birmingham	9.11	11.00	11.39	10.10	8.91	13.14	16.65	9.12	9.06	10.70
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.60	10.10
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	8.20	9.70
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	12.15	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	10.48	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	10.95
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.05	17.70	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellsville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup, Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Hays, Pa., Hammond, Ind., $107; Nario, Ohio, $109.50. Magnesite: Nario, Ohio, $128; Hays, Pa., Hammond, Ind., $130.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅜ in. grains bulk, Luning, Nev., $46; ⅜ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb. f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh bags	7.40††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, 1 in. x 1 in. x 1/16 in. (In contract lots of 750 tons price is 22.75c)	27.75
Annealed, 99.5% Fe, ton deld. east of Mississippi.	36.75
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 41.30; ton lots	40.30
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90-10.	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4600	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5% below 5 microns	2.32
Molybdenum	3.50-4.10

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. (Source of shipment: Western Continental Europe.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.05	$5.10	$5.00	$4.90	$5.20
Bar Size Angles	5.15	....	5.10	5.00	5.30
Structural Angles	5.15	5.20	5.10	5.00	5.30
I-Beams	5.15	5.20	5.10	5.00	5.30
Channels	5.20	5.25	5.15	5.05	5.35
Plates (basic bessemer)	5.20	5.25	5.10	5.10	5.45
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	24.16	....	24.09	23.81	25.54
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.20	5.25	5.15	5.05	5.35
Hot-Rolled Bands	5.65	5.70	5.60	5.50	5.80
Wire Rods, Thomas No. 5 (Niederrhein)	5.40*	5.50	5.35	5.35	5.60
Wire Rods, O.H., No. 5 (Niederrhein)	5.70*	5.80	5.65	5.65	5.90
Bright Common Wire Nails (§)	7.05	7.10	7.00	6.90	7.20
(Source of Shipment: Japan)					
Wire, galvanized	8.60	....	8.60	8.60	8.55
Wire, bright	7.60	....	7.60	7.60	7.55
Wire Rods, O.H. No. 5 (Sumitomo)	5.60	....	5.60	5.50	....
Strand, stress relieved (Sumitomo)					
⅜ in. diam, 100 lineal ft	39.90	41.00	39.90	39.90	39.50
7/16 in. diam, 1000 lineal ft	53.50	54.70	53.50	53.50	53.00
Bright common wire nails	7.00	7.30	7.00	7.00	7.00

†Per 82 lb net reel. §Per 100 lb keg, 20d and heavier. *Except Boston.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic Ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$14.75-15.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 82.00-85.00c nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.75
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	35.00-37.00†
Domestic	
Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

60% min	$4.15-4.40
65% min	4.50-4.75

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3% for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max), Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%), Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb. $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 24.00c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5.25% max, Si 3% max, S 0.03% max, 22.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, S 0.03% max, 23.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03% max, 24.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 68-71%: C 0.025% max, 33.00c; C 0.010% max, 33.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max, 33.50c. Cr 67-73% C 0.05% max, 33.00c; C 0.75% max, 33.00c; C 2.0% max, 32.5c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). 8M x D, carload, bulk, 36.50c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 11.50c per lb material; Cr 44-47%, Si 37-39%, C 0.15% max, 12.60c per lb material.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.5c per lb contained Si. Packed, c.l. 17.0c, ton lot 18.45c, less ton 20.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered, Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3⅛ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (55-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo. in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.

CORROSION? WEAR?

End pump problems with ADVANCED

Deming End Suction Centrifugal Pump. 1" to 6" discharge size. 10 G.P.M. to 2400 G.P.M. Heads to 240 feet. ¼ H.P. to 25 H.P. Most sizes right or left hand rotation.

DEMING CENTRIFUGALS

Deming advance design features show you why Deming Pumps handle toughest jobs with ease—

■ Liquid ends range from tough cast iron to special corrosion-resistant alloys.

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■ A Deming is the simplest to service.

Send your problem to Deming—"Pump Information Headquarters."

DEMING
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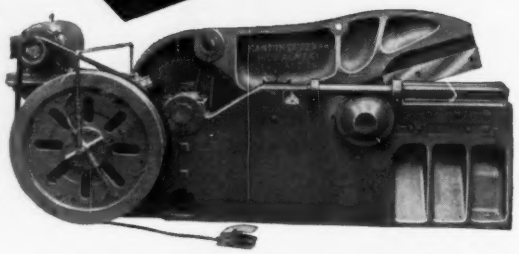
1251 Broadway • Salem, Ohio

Write for *Bulletin 4011-E*

"CANTON" Alligator Shears



For production cutting of bars, flats, rounds, angles, etc. Available with air operated stop motion clutch, hold down, length gauge and special grooved knives. "CANTON" shears are complete self contained units requiring no foundation. Low cost operation and minimum maintenance are proven features. Made in a complete range of sizes and models for every shearing need.

The **HILL ACME** *Company*
"CANTON" DIVISION 1201 West 65th St. CLEVELAND 2, OHIO

Bulletin S60 gives details.

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

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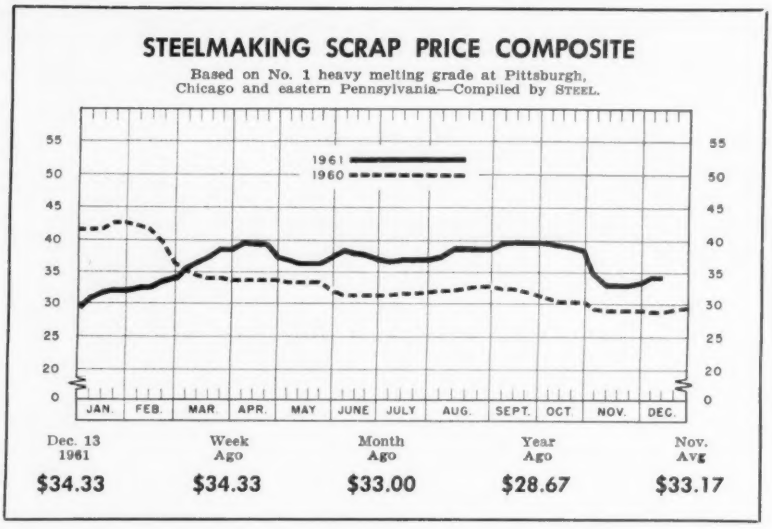
If your company performs plating, galvanizing, finishing or any one of dozens of metalworking operations on a contract basis, you can attract new customers by inserting an advertisement in the classified pages of STEEL.



Scrap Price Upturn Is Stalled

STEEL's composite on No. 1 heavy melting steel holds at $34.33 following recent advances. Steadiness seen prelude to stronger market after the holiday lull

Scrap Prices, Page 190

• **Pittsburgh**—Prices are firm in a quiet market. Sellers were disappointed when bids on B&O Railroad scrap went up less than they had expected, but they're still counting on an upturn later this month. No. 2 bundles are holding at $25 a ton—a price that sellers feel is too low. They can't get more because only one mill is buying, and it could boost its hot metal output readily.

• **Chicago**—Rising steelmaking operations continue to exert pressure on the scrap market. Most open hearth grades are holding firmly at the $2 a ton advance in price effected about two weeks ago, but some foundry and specialty grades have moved up another $1 to $3 a ton.

• **Philadelphia** — The market is slow but prices are unchanged. Most traders look for the market to drift over the rest of this year and then quicken a bit. Exports from this port in November totaled 25,815 tons vs. 49,259 in October. Most of the movement is for Japan, which is now negotiating for first quarter scrap requirements.

• **New York** — Brokers' buying prices are unchanged with demand dull and little business coming out to provide a test of current quotations. Sellers expect no significant change in the situation until after the holidays.

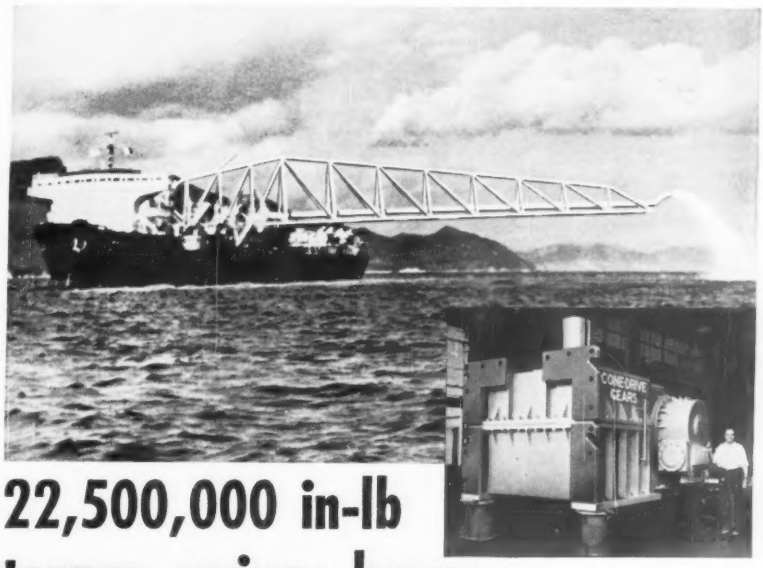
• **Cleveland**—Prices are holding at the higher levels recently established, No. 1 heavy melting being quoted $33-$34 at Cleveland and $36-$37 in the Valley. Only limited trading is reported at present. Little activity is likely until after the holidays. Traders anticipate higher prices with resumption of active buying, some predicting a rise of $3 to $4 in first quarter.

• **Buffalo**—Prices on No. 2 bundles have dropped another $1 a ton in this market as result of a mill purchase for December delivery.

• **Detroit**—Demand continues slow but the market is steady. Small orders are being filled at current price levels. Export activity is lacking and local dealers are attempting to clear out their yards for yearend inventory tax purposes.

• **Cincinnati**—Despite the lack of

(*Please turn to Page* 195)



22,500,000 in-lb torque swings boom

This ocean-going dredge "Zulia" has a 437' discharge boom that rotates 180° to pump waste beyond a channel project's limits. The Cone-Drive speed reducer that does the job is shown in the inset. Due to the **double-enveloping worm** gear principle, this compact housing is capable of producing 22,500,000 in-lb torque—sufficient to "stow away" the giant boom in a 75 MPH wind.

Powerful Cone-Drive worm gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 13, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 13	$34.33
Dec. 6	34.33
Nov. Avg.	33.17
Dec. 1960	28.92
Dec. 1956	64.29

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	25.00-26.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling	35.00-36.00
No. 1 factory bundles	41.00-42.00
Machine shop turnings	*14.00-15.00*
Mixed borings, turnings	*14.00-15.00*
Shovel turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	*40.00-41.00*
3 ft and under	*37.00-38.00*
Heavy turnings	31.00-32.00
Punchings & plate scrap	*42.00-43.00*
Electric furnace bundles	42.00-43.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	30.00-31.00
Stove plate	30.00-31.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	32.00-33.00
Drop broken machinery	44.00-45.00§

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00-39.00*
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Random rails	45.00-46.00
Angles, splice bars	43.00-44.00
Railroad specialties	*46.00-47.00*
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-195.00
18-8 turnings	115.00-120.00
430 bundles & solids	90.00-95.00
410 turnings	55.00-60.00

CHICAGO

No. 1 hvy melt., indus.	34.00-35.00
No. 1 hvy melt., dealer	32.00-33.00
No. 2 hvy melting	29.00-30.00
No. 1 factory bundles	37.00-38.00
No. 1 dealer bundles	33.00-34.00
No. 2 bundles	24.00-25.00
No. 1 busheling, indus.	34.00-35.00
No. 1 busheling, dealer	32.00-33.00
Machine shop turnings	*18.00-19.00*
Mixed borings, turnings	*20.00-21.00*
Shovel turnings	*20.00-21.00*
Cast iron borings	*20.00-21.00*
Cut structurals, 3 ft	*43.00-44.00*
Punchings & plate scrap	*45.00-46.00*

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	35.00-36.00
Unstripped motor blocks	33.00-34.00
Clean auto cast	46.00-47.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
R.R. malleable	*48.00-50.00*
Rails, 2 ft and under	*51.00-52.00*
Rails, 18 in. and under	*53.00-54.00*
Angles, splice bars	44.00-45.00
Axles	53.00-54.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles, solids	*175.00-180.00*
18-8 turnings	100.00-105.00
430 bundles & solids	80.00-85.00
430 turnings	45.00-50.00

BUFFALO

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	27.00-28.00
No. 2 bundles	*22.00-23.00*
No. 1 busheling	27.00-28.00
Shovel turnings	17.00-18.00
Machine shop turnings	12.00-13.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	36.00-37.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cuopla	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	38.00-39.00
Rails, 3 ft and under	44.00-45.00
Railroad specialties	37.00-38.00
Rails, rerolling	60.00-61.00

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	23.00-24.00
No. 1 factory bundles	37.00-38.00
No. 1 bundles	34.00-35.00
No. 2 bundles	22.00-23.00
No. 1 busheling	34.00-35.00
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut foundry steel	34.50-35.50
Cut structurals, plate 2 ft and under	39.00-40.00
Low phos. punchings & plate	35.00-36.00
Alloy free, short shovel turnings	20.00-21.00
Electric furnace bundles	35.00-36.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	26.00-27.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	27.00-28.00
Brake shoes	37.00-38.00
Clean auto cast	39.00-40.00
Burnt cast	30.00-31.00
Drop broken machinery	45.00-46.00

Railroad Scrap

R.R. mallable	48.00-49.00
Rails, 2 ft and under	48.00-49.00
Rails, random lengths	45.00-46.00
Rails, 18 in. and under	50.00-51.00
Cast steel	40.00-41.00
No. 1 railroad cast	45.00-46.00
Railroad specialties	46.00-47.00
Angles, splice bars	43.00-44.00
Rails, rerolling	50.00-51.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	85.00-90.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	26.00-27.00
No. 1 busheling	37.00-38.00
No. 1 bundles	37.00-38.00
No. 2 bundles	24.00-25.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	38.00-39.00
Electric furnace bundles	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	32.50-33.50
No. 2 heavy melting	25.00-26.00
No. 1 bundles	33.50-34.50
No. 2 bundles	18.00-19.00
No. 1 busheling	32.50-33.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	33.00-34.00
Heavy breakable cast	29.00-30.00
Charging box cast	32.00-33.00
Drop broken machinery	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	30.00-31.00
No. 2 bundles	21.00-22.00
No. 1 busheling	27.00-28.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	11.00-12.00

Cast Iron Grades

No. 1 cupola	30.00-31.00
Mixed cast	29.00-30.00
Heavy breakable	25.00-26.00
Unstripped motor blocks	21.00-22.00
Clean auto cast	37.00-38.00

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	70.00-75.00
430 bundles & solids	65.00-70.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	36.00
No. 2 bundles	23.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	15.00†
Shovel turnings	20.00
Machine shop turnings	13.00†
Heavy turnings	24.00†
Structurals & plates	38.00-40.00
Couplers, spring, wheels	40.00
Rail crops, 2 ft & under	48.00-49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	39.00
Drop broken machinery	48.00
Malleable	48.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00-19.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	145.00-150.00
18-8 borings, turnings	70.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	31.00
No. 2 heavy melting	27.00
No. 1 bundles	32.00
No. 2 bundles	*22.00*
No. 1 busheling	32.00
Machine shop turnings	*15.50*
Shovel turnings	*17.50*

Cast Iron Grades

No. 1 cupola	34.00
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	37.00
Stove plate	31.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00
Rails, random lengths	*39.00*
Rails, rerolling	52.00
Rails, 18 in. and under	43.00
Railroad specialties	38.00
Angles, splice bars	38.00

BIRMINGHAM

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	36.00-37.00
Cast iron borings	*10.00-11.00*
Machine shop turnings	16.00-17.00
Shovel turnings	*19.00-20.00*
Bar crops and plate	*42.00-43.00*
Structurals & plate	*41.00-42.00*
Electric furnace bundles	36.00-37.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	*36.00-37.00*

Cast Iron Grades

No. 1 cupola	*40.00-41.00*
Stove plate	*40.00-41.00*
Unstripped motor blocks	29.00-30.00
No. 1 wheels	*34.00-35.00*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, rerolling	46.00-47.00
Rails, 2 ft and under	*45.00-46.00*
Rails, random lengths	*41.00-42.00*
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	36.00-37.00
No. 2 bundles	23.00-24.00
Machine shop turnings	12.50-13.00
Crushed turnings	18.00-19.00
Low phos. plate & structurals:	
3 ft	39.00-40.00
2 ft and under	43.00-44.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable	24.00-25.00
Foundry malleable	28.00-29.00
Unstripped motor blocks	29.00-30.00

Railroad Scrap

R.R. heavy melt (3 ft)	36.00-37.00

LOS ANGELES

No. 1 heavy melting	*30.00-35.00*
No. 2 heavy melting	*22.00-27.00*
No. 1 bundles	*23.00-24.00*
No. 2 bundles	19.00†
Machine shop turnings	10.00
Shovel turnings	10.00
Cast iron borings	10.00
Electric furnace scrap	44.00

Cast Iron Grades

No. 1 cupola	45.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*38.00*
No. 2 heavy melting	*35.00*
No. 2 bundles	*25.00*
Shovel turnings	*16.00*
Electric furnace	*50.00-54.00*

Cast Iron Grades

No. 1 cupola	*36.00*
Heavy breakable	*33.00*
Unstripped motor blocks	*31.00*
Stove plate (f.o.b. plant)	*31.00*

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	*38.00*
No. 1 hvy (unprepared)	*33.00*
No. 2 heavy melting	*35.00*
No. 2 hvy (unprepared)	*31.00*
No. 2 bundles	*25.00*
Shovel turnings	16.00
Electric furnace	*51.00-55.00*

Cast Iron Grades

No. 1 cupola	*36.00*
Heavy breakable cast	*33.00*
Stove plate	*31.00*
Unstripped motor blocks	*31.00*

SAN FRANCISCO

No. 1 heavy melting	35.00**
No. 2 heavy melting	30.00**
No. 1 bundles	25.00**
No. 2 bundles	22.00**
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Shovel turnings	15.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

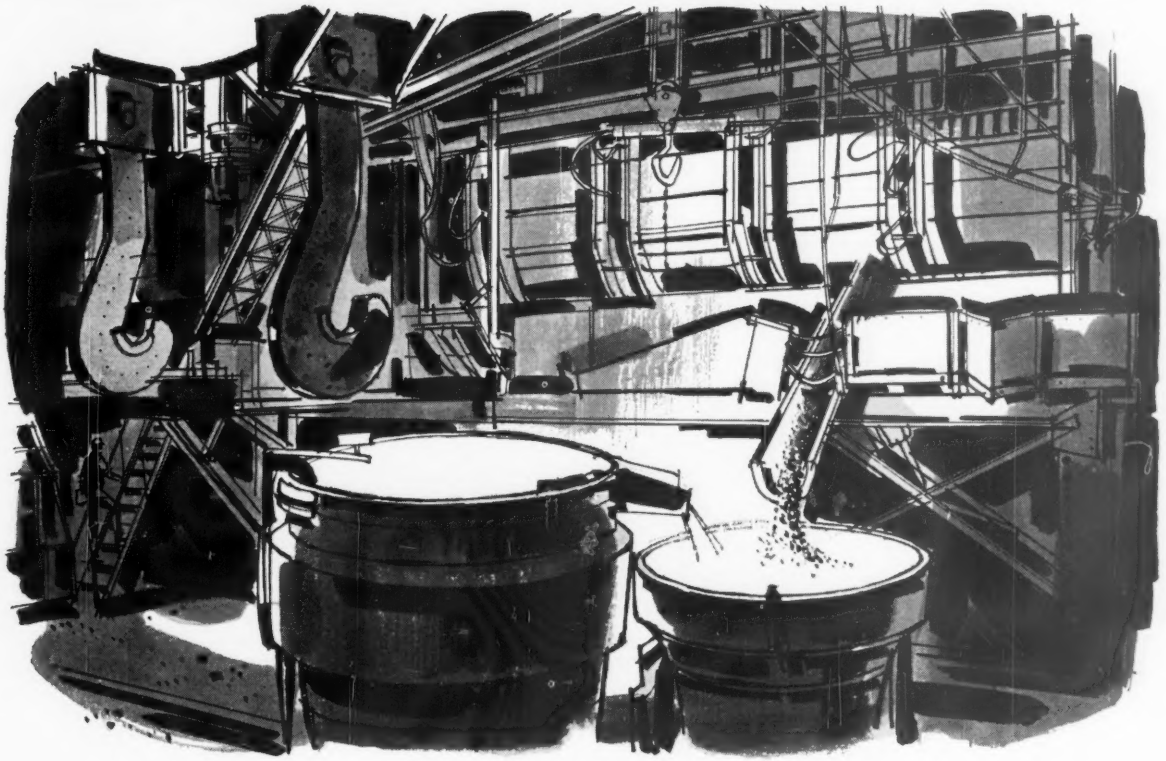
No. 1 heavy melting	27.00
No. 2 hvy melt, 2 ft & under	26.00
No. 1 bundles	28.00
No. 2 bundles	21.50
Mixed steel scrap	19.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	27.00
Unprepared	21.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

DANGEROUS INTRUDERS IN IRON AND STEEL



ARSENIC . . . FRIEND OR FOE?

Arsenic is useful for the resistance to corrosion and erosion which its presence imparts to copper and arsenic bronze. Alloyed with lead, it facilitates the forming of perfect spheres in producing shot.

Its presence in a steel composition, however, is another matter. Arsenic is likely to make its first appearance in the raw materials entering the blast furnace. Present in any quantity either in the iron ores or the coke, it will appear in the pig iron and eventually find its way into the finished steel. A certain amount may also be present in contaminated scrap.

In quantities of more than one percent, arsenic may reduce the ductility and impact strength of steel and eventually cause surface cracking. Even small amounts may induce loss of toughness in chromium-nickel steels in the heat treated condition. Compared with some of the other residual elements, arsenic has not been one of the major enemies present in steel but it is an element that bears consideration and continued study.

For scrap of known analysis, our personnel, equipment and strategically located facilities are specifically geared for the purchase or sale of dependably segregated metals. We welcome your inquiry.

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Harvey Aluminum Maps Major Expansion

Lawrence Harvey says:

"No small company grows unless its products are above average in quality."

Nonferrous Metal Prices, Pages 194 & 195

THE NATION'S youngest primary aluminum producer is planning a sharp expansion program.

Lawrence Harvey, executive vice president and chairman of Harvey Aluminum Inc., says that by 1963, the company plans to have its own alumina plant and bauxite mines in operation. Also in the planning stage: Expansion of primary capacity, probably to double the present 75,000-ton-a-year plant at The Dalles, Oreg.

• **Challenging the Giants** — In terms of total company size, Harvey is still by far the smallest in the aluminum field. Yet it's not shying away from competing with the industry giants. Harvey is now distributing nationwide through service centers. It recently purchased the government-owned wrought products plant at Adrian, Mich., which almost doubles its mill product capacity. Work has been started on a Western sheet and strip rolling mill with more than 30,000 tons capacity.

• **Profitable**—The company's earnings are on the increase. In the 12 month period ended Sept. 20, Harvey had profits of $7,100,163 on sales of $86,444,767 compared with the previous year's earnings of $5,007,837 on sales of $59,681,142.

"We have the lowest administrative costs per dollar of sales of any company in the metals industry," says Mr. Harvey. "As we integrate more fully, we will become more successful and profitable."

Some sources point out that Harvey's profit picture is enhanced by its "put right" contracts with the government that allow it to tender a portion of its production to the U. S. stockpile. Mr. Harvey attributes his company's growth to good management, maintaining high quality, developing new products, and emphasizing service.

Good Year for Zinc

SLAB zinc shipments for 1961 will be even better than the industry had estimated at the beginning of the fourth quarter. November shipments rose to 85,563 tons. Total shipments for 1961 are now certain to exceed 900,000 tons for the best year since 1957.

Producers' stocks dropped in November for the eighth straight month. They stand at 146,381 tons compared with a high of 222,889 tons at the end of March.

Smelter production reached the year's high of 81,861 tons in November. Output for the year should total just under 900,000 tons compared with 867,629 tons in 1960.

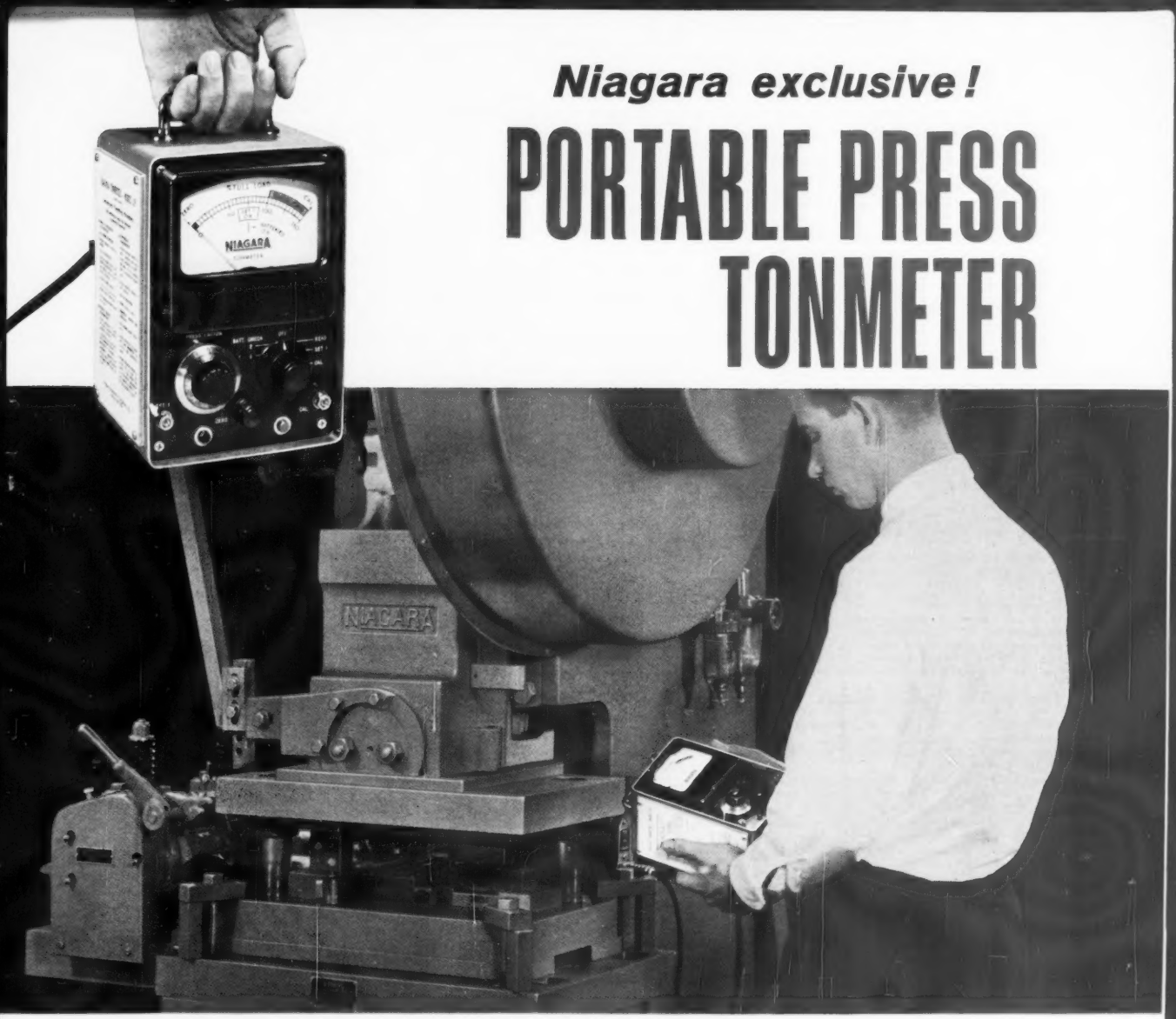
Brass Imports Down

IMPORTS of brass mill products will be down sharply this year. Through October they totaled 86,-

(*Please turn to Page* 195)

Niagara exclusive!

PORTABLE PRESS TONMETER



Battery-powered, transistorized instrument contains latest, miniaturized, electronic components.

protects press and dies against overloads . . . pays for itself many times over

A must for *every* press operation. Yet it's available only from Niagara . . . and only Niagara presses can come equipped with it!

Tonmeter is a fast, accurate, portable instrument that measures loads imposed on a press during production and takes the *guesswork* out of die setup. By attaching small electronic pickups to the frame of each press, *one Tonmeter can serve your entire plant.*

Safeguards against broken crankshafts and cracked frames. Eliminates costly downtime and major repairs. Protects expensive dies from damage. Avoiding just one such overload disaster can more than pay for your complete Tonmeter installation.

To learn how any new Niagara press or press brake can be *factory-equipped* with Tonmeter protection . . . write for Product Report No. 2 today. Niagara Machine & Tool Works, Buffalo 11, N. Y. District Offices and Distributors Everywhere.

NIAGARA

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 30 and 50 lb ingots, 24.00, 30,000 lb or more, f.o.b. customer custody.
Aluminum Alloy: No. 13, 25.20; No. 43, 25.30; No. 195, 26.70; No. 214, 28.10; No. 356, 26.00, 30 and 50 lb ingots.
Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.
Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.
Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.
Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.
Bismuth: $2.25 per lb, ton lots.
Cadmium: Sticks and bars, $1.70 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.
Columbium: Powder, $40 per lb and up nom.
Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.
Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.
Gold: U. S. Treasury, $35 per oz.
Indium: 99.9%, $2.25 per troy oz.
Iridium: $70-75 per troy oz nom.
Lead: Common, 10.05; chemical, 10.15; corroding, 10.15; St. Louis, New York basis, add 0.20.
Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.
Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.
Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.
Mercury: Open market, spot, New York, $188-191 per 76 lb flask.
Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.
Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09.
Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 77.50.
Osmium: $70-90 per troy oz nom.
Palladium: $24-26 per troy oz.
Platinum: $82-85 per troy oz from refineries.
Radium: $16-21.50 per mg radium content, depending on quantity.
Rhodium: $137-140 per troy oz.
Ruthenium: $55-60 per troy oz.
Selenium: $5.75 per lb, commercial grade.
Silver: Open market, 102.75 per troy oz.
Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $5.25 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot and prompt, 120.875.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.
Zinc: Prime Western, 12.00; brass special 12.20; intermediate, 12.20, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Diecasting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00; No. 12 foundry alloy (No. 2 grade), 21.25; 5% silicon alloy, 0.60 Cu max, 23.00; 13 alloy, 0.60 Cu max, 23.00; 195 alloy, 24.25; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.98, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.98, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $15.75 per cwt; pipe, full coils, $15.75 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	44.40-47.00
0.183-0.154	24-72	72-180	44.40-47.00
0.154-0.120	24-72	72-180	44.90-47.80
0.120-0.096	24-72	72-180	44.90-47.80
0.096-0.076	24-72	72-180	45.40-49.30
0.076-0.060	24-72	72-180	45.90-50.10
0.060-0.047	24-72	72-180	46.40-51.30
0.047-0.037	24-72	72-180	46.90-52.70
0.037-0.030	24-72	72-180	47.40-54.30
0.030-0.023	24-60	72-180	47.90-56.10
0.023-0.018	24-48	72-144	48.40-56.40
0.018-0.014	24-48	72-144	50.20-57.00
0.014-0.011	24-48	72-144	52.50-59.00
0.011-0.0085	24-36	72-96	55.20
0.0085-0.007	24-36	72-96	58.20
0.007-0.006	24-36	72-96	61.00

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	45.10-50.00
2.000-1.251	6-144	72-240	45.50-50.30
1.251-0.751	6-144	72-240	44.50-49.60
0.751-0.250	6-144	72-240	44.50-49.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam. (in.)•	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	76.30	....	....
0.188	63.20	62.20	....	79.10
0.250	60.00	61.60	72.70	73.10
0.375	59.20	62.80	71.00	71.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	62.80	71.00	71.00
0.625	59.20	62.80	67.80	66.90
0.750	57.70	61.00	61.60	62.80
0.875	57.70	61.00	61.60	62.80
1.000	57.70	61.00	61.60	62.80
1.125	55.30	58.50	59.50	60.50
1.375	55.30	58.50	59.50	60.50
1.500	55.30	58.50	59.50	60.50
1.625	53.00	55.70	....	58.30
1.750	53.00	55.70	58.30	58.30
1.875	53.00	55.70	....	58.30
2.000	53.00	55.70	58.30	58.30
2.250	51.50	54.00	....	58.30
2 500	51.50	54.00	....	58.30
2.750	49.90	52.20	....	58.30
3.000	49.00	52.20	....	58.30
3.250	....	52.20	....	....
3.375	....	52.20	....	....

Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 45.50-55.60; 6061, 41.50-55.60; 7075, 56.50-64.60; 7079, 58.50-66.60.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes, 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in. 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.00-19.50; No. 1 composition red brass, 21.00-21.50; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

(Copper or Copper Alloy No.)	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper (110)	56.13b	50.36–51.36	....	57.32
Yellow Brass (268, 270)	49.27	35.77c	49.56	53.43
Low Brass, 80% (240)	52.15	52.09	52.44	56.21
Red Brass, 85% (230)	53.17	53.11	53.46	57.23
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54
Manganese Bronze (675)	57.69	51.27	61.54	....
Muntz Metal (365)	51.94	47.25	....	....
Naval Brass (464)	53.94	47.75	60.25	58.10
Silicon Brass (651)	61.39	60.58	60.68	79.80
Nickel Silver, 10% (745)	65.56	67.16	66.91	....
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90

SCRAP ALLOWANCES d (Based on copper at 31.00c)

Clean Heavy	Rod Ends	Clean Turnings
27.00	27.00	26.25
20.375	19.50c	18.50c
22.875	22.625	22.125
23.875	23.625	23.125
24.75	24.50	24.00
19.25	19.00	18.50
19.125	18.875	18.375
19.00	18.75	18.25
26.50	26.25	25.75
26.00	25.75	13.00
28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

(*Concluded from Page* 192)

375,000 lb compared with 164,021,000 lb for all of 1960. Imports will probably wind up the year around 100 million lb, lowest since 1956.

Exports, however, are up. For the first ten months they total 19,549,000 lb, better than the 17,968,000 lb shipped in all of 1960.

Extrusion Ingot Price Cut

THE 1 CENT a pound no-toll allowance on aluminum extrusion ingots is again in effect. Kaiser Aluminum & Chemical Corp. initiated the move earlier this month, was immediately followed by the other producers. Kaiser also announced small price adjustments.

Historically, the extruder has been able to ship his scrap back to the primary producer and have it recast into ingots for a small toll. It's an open secret producers never have been too happy about handling such scrap. It led to the no-toll arrangement whereby the extruder received a discount on billets if he did not send the scrap back.

composition turnings, 20.00-20.50; new brass clippings, 15.00-15.50; light brass, 12.00-12.50; heavy yellow brass, 13.00-13.50; new brass rod ends, 14.00-14.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.00-17.50; brass pipe, 15.00-15.50.

Lead: Soft scrap lead, 6.25-6.50; battery plates, 2.00-2.25; linotype and stereotype, 7.50-7.75; electrotype, 7.00-7.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 32.00; old sheets, 30.00; turnings, 22.00-24.00; rods, 32.00.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 60.00-62.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.25; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.00-8.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 10.00-10.50; segregated high copper clips, 9.00-9.50; mixed low copper clips, 9.50-10.00; mixed high copper clips, 9.00-9.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.00-14.50; segregated high copper clips, 12.50-13.50; mixed low copper clips, 12.00-13.00; mixed high copper clips, 11.00-12.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 9.75; clean borings and turnings, 8.50; segregated low copper clips, 13.00; segregated high copper clips, 12.25; mixed low copper clips, 12.50; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.75; light copper, 22.50; refinery brass (60% copper) dry copper content, 23.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.75; light copper, 22.50; No. 1 composition borings, 23.50; No. 1 composition solids, 24.00; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 20.00.

Scrap . . .

(*Concluded from Page* 189)

new orders, the market is firmer. Shipments are being made on mill programs at the higher prices recently posted. Traders say it's becoming difficult to fill orders as collectors are reluctant to let loose of material, anticipating higher prices in January. Adverse weather conditions are cutting down yard activities.

• **St. Louis**—Demand is spotty and selective, but the market tone is definitely stronger and some prices have stiffened. Several steelmaking grades are up $1 to $2 a ton. Prospects for the first quarter are considered promising of a pickup in buying. The mills are paying quoted prices, but are not getting all the material they want. They are reluctant to push their offering prices up.

• **Birmingham**—Local buyers are showing more interest in scrap, largely seeking January shipment tonnage. In general, prices are up about $1 a ton.

• **Houston**—Little activity is reported in the district market. Over-the-scale traffic in dealers' yards has been discouraged by low prices.

• **San Francisco**—Prices are holding following two weeks of decline. However, it's reported that "deals" are being made at prices ranging from $1 to $3 a ton below published quotations.

• **Seattle**—After several weeks during which no prices were posted by sellers, dealers here and in Portland have announced the following listings: No. 1 heavy melting $38, No. 2 heavy melting $35, No. 2 bundles $25, electric furnace scrap $50-$55, No. 1 cupola cast $36, heavy breakable cast $33, unstripped motor blocks $31, stove plate $31.

• **Los Angeles**—With supplies substantially in excess of demand, prices are weak in this market. No. 2 heavy melting steel is the chief grade that's plentiful. Dealers do not anticipate much recovery in the market until next quarter.

Tool Steel . . .

Tool Steel Prices, Page 184

Shipments of tool steels (excluding hollow drill steel) gained in October, totaling 7738 tons vs. 6649 in September, and 5990 in October, 1960, reports the American Iron & Steel Institute.

The total movement for the first ten months of this year was 64,624 net tons, down substantially from the 75,382 tons moved in the like period of 1960.

Refractories . . .

Refractories Prices, Page 186

Harbison - Walker Refractories Co., Pittsburgh, has developed a 98 per cent pure MgO, high density refractory grain. It is being produced in large tonnages and without moving the cost out of the present price range.

CLASSIFIED

Business Opportunities

OPPORTUNITY AVAILABLE

Kansas-Missouri area steel fabricating company is launching a program of product diversification; desires connections with individuals or companies with new or existing steel products or plans in such diversified fields as:

Truck Bodies—Trailers
Cranes—Conveyors—Material Handling
Steel Building—Industrial Doors
R. R. Cars—Racks—Loaders
Farm Implements—Feeders
Hoppers—Bins
Continuous Cleaners—Dryers
Steel Swimming Pools
Drilling and Mining Structural Steel

Further information will be submitted upon request.

Box 981, STEEL
Penton Bldg. Cleveland 13, Ohio

Help Wanted

FACTORY MANAGER

Manager experienced in sheet metal, press brake, spot welding, painting and assembly operations. Some purchasing experience helpful and tooling knowledge mandatory.

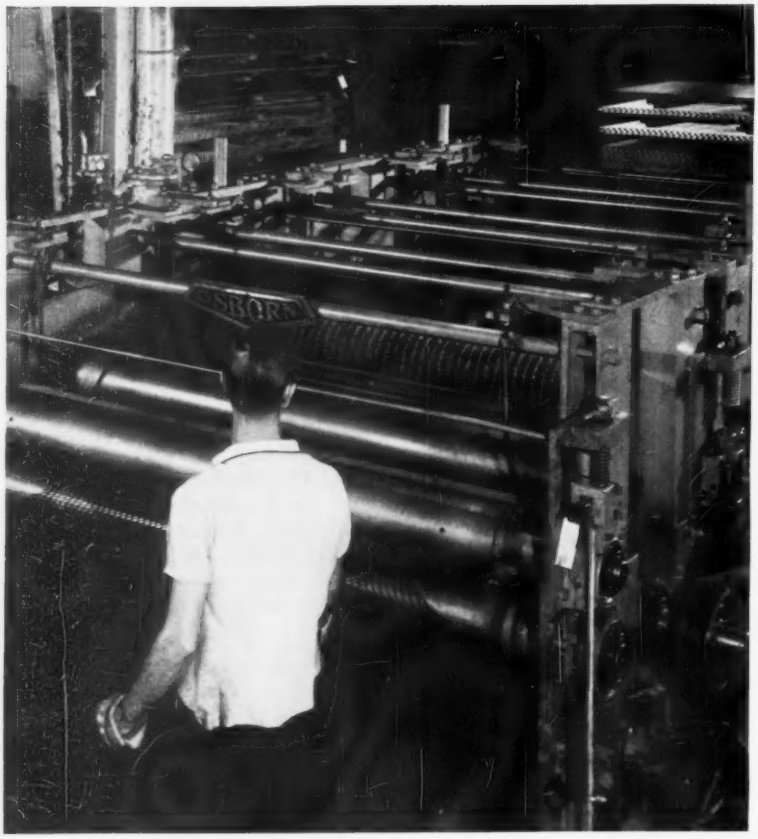
Small-medium sized manufacturer of appliances and sheet metal contract work. Position normally carries vice president title with full authority. Age no factor—need well-seasoned experienced manufacturing and/or production man. This ad inserted by president of company.

Write Box 979, STEEL
Penton Bldg. Cleveland 13, Ohio

Accounts Wanted

DETROIT MEANS BUSINESS

Can get Detroit Area Business for you in castings, forgings, screw machine parts. Describe facilities in letter to Box No. 980, STEEL, Penton Bldg., Cleveland 13, Ohio.



FOUR-STAND POWER BRUSHING MACHINE automatically deburrs and edge-blends top and bottom of expanded metal sheet in one cycle. Sheets are passed through four quadied knot-type Osborn brushes. Pressure on each brushing head can be adjusted individually. Output per 8-hr. shift: 40,000 sq. ft.

COMPETITIVE EDGE for expanded metal . . . it's deburred with OSBORN power brushing

Problem: This manufacturer of expanded metal products needed a fast, economical way to produce burr-free expar.ded metal sheet.

Solution: Four standard Osborn finishing machines were used as "building blocks" to develop this special in-line finishing unit. Brushing is done by four quadied knot-type Osborn brushes. Sheets are fed through the machine automatically at rate of 50 fpm—emerge completely burr-free and edge-blended on both sides after just one pass. They report the method is fast, simple, inexpensive . . . gives them a definite product quality advantage over competition.

Today's advanced Osborn power brushes and brushing methods can help you boost output, improve quality, reduce cost on metal finishing jobs of every type—deburring, cleaning, polishing, precision blending. An **O**sborn **B**rushing **A**nalysis can show you how. Write or call *The Osborn Manufacturing Company, Dept. S-42, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery

Advertising Index

Allegheny Ludlum Steel Corporation 166
Allen-Bradley Co. 41
Allen Manufacturing Co. 25
Allis, Louis, Co., The 198
Aluminium Limited Sales, Inc. 154, 155
Amchem Products, Inc. 60, 61
American Hoist & Derrick Co. 16
American Oil Co. 116, 117
American Optical Co., Safety Products Division 50
Anaconda Wire & Cable Co. 62
Associated Spring Corporation 133
Athenia Steel Division, National-Standard Co. 17

Babcock & Wilcox Co., The, Refractories Division 11
Barnes, Wallace, Co., Ltd. 133
Barnes, Wallace, Division, Associated Spring Corporation 133
Barnes, Wallace, Steel Division, Associated Spring Corporation 133
Bay State Abrasive Products Co. 2, 3
Bendix Corporation, The, Industrial Controls Section 142
Bethlehem Steel Co. 1, 56, 57
B-G-R Division, Associated Spring Corporation 133
Blaw-Knox Co., Foundry & Mill Machinery Group 163
Bliss, E. W., Co., Heavy Equipment Division 120
Boston Gear Works 150
Bullard Co., The 100

Cattie, Joseph P., & Brothers, Inc. 188
Chicago Steel Service Co. 140
Cincinnati Lathe & Tool Co. 23, 24
Cincinnati Shaper Co., The 151
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. 53, 54
Colorado Fuel & Iron Corporation, The ..42, 43
Columbia-Geneva Steel Division, United States Steel Corporation 37, 38, 39, 40, 79
Cone-Drive Gears, Division Michigan Tool Co. 189
Consolidated Machine Tool Division, Farrel-Birmingham Co., Inc. 174
Continental Steel Co. 156
Crane Co., Deming Division 188
Cutler-Hammer, Inc. 14, 15

Deming Division, Crane Co. 188
Dempster Brothers 170
Despatch Oven Co. 172
Detroit Steel Corporation 80
DeVilbiss Co., The 99
Doehler-Jarvis Division of National Lead Co. 66
Dow Chemical Co., The 65
Drever Co. 7
Dunbar Brothers Division, Associated Spring Corporation 133
Dykem Co., The 188

Eastman Kodak Co., X-ray Sales Division .. 157
Electric Controller & Mfg. Division, Square D Co. ..... Inside Front Cover

Farrel-Birmingham Co., Inc., Consolidated Machine Tool Division 174
Formed Tubes, Inc. 6

Gardner-Denver Co. 8
Garlock, Inc. 36
General Services Administration 160
Gibson Division, Associated Spring Corporation 133
Gilmore Industries, Inc. 171
Gisholt Machine Co. 18
Glidden Co., The, Coatings & Resins Division 94
Gregory Industries, Inc., Nelson Stud Welding Division 52

Harnischfeger Corporation 181, 182
Haynes Stellite Co., Division of Union Carbide Corporation 119
Hill Acme Co., The, "Canton" Division 188
Hobart Brothers Co. 173
Hooker Chemical Corporation 48
Horsburgh & Scott Co., The 162
Hyde Park Foundry & Machine Co. 107

Inland Steel Co. 114
International Packings Corporation 168

Jones & Lamson Machine Co. .....67 thru 78

Kaupp, C. B., & Sons 197
Kinnear Manufacturing Co., The 121
Kirk & Blum Manufacturing Co., The 149

Lamb, F. Jos., Co. 84
Linde Co., Division Union Carbide Corporation 158, 159
Link-Belt Co. 4
Luria Brothers & Co., Inc. 191

McKay Machine Co., The 103

Malleable Castings Council 146, 147
Manross, F. N., & Sons Division, Associated Spring Corporation 133
Merchandise Division, Associated Spring Corporation 133
Metal & Thermit Corporation 124
Michigan Tool Co., Cone-Drive Gears Division 189
Midland-Ross Corporation, Surface Combustion Division 143
Midvale-Heppenstall Co. 108
Milwaukee Division, Associated Spring Corporation 133
Mobil Oil Co. 134, 135
Morgan Construction Co. 112, 113
Mueller Brass Co. 152, 153

National Acme Co., The 122, 123
National Lead Co., Doehler-Jarvis Division .. 66
National-Standard Co. 49
National-Standard Co., Athenia Steel Division 17
National-Standard Co., Reynolds Division 33
National Tube Division, United States Steel Corporation 37, 40, 79
Nelson Stud Welding, Division of Gregory Industries, Inc. 52
New England High Carbon Wire Corporation 106
New Jersey Zinc Co., The 164, 165
Niagara Machine & Tool Works 193
Northern Engineering Works 161

Ohio Crankshaft Co., The 148
Ohio Division, Associated Spring Corporation 133
Osborn Manufacturing Co., The 196

Pangborn Corporation ..... Inside Back Cover
Pittsburgh Steel Co. 46, 47
Pratt & Whitney Co., Inc. 63

Raymond Manufacturing Division, Associated Spring Corporation 133
Reliance Electric & Engineering Co. 58, 59
Republic Steel Corporation 12, 13
Reynolds Division, National-Standard Co. 33
Royal McBee Corporation 64

Seaboard Pacific Division, Associated Spring Corporation 133
Selas Corporation of America 44, 45
Sharon Steel Corporation 82, 83
Shell Oil Co. 144
Signode Steel Strapping Co. 93
Square D Co., Electric Controller & Mfg. Division ..... Inside Front Cover
Stauffer Chemical Co., West End Chemical Co. Division 55
Street, Gordon, Inc., The Wheland Foundry Division 160
Sun Oil Co., Industrial Products Department .. 9
Surface Combustion, A Division of Midland-Ross Corporation 143

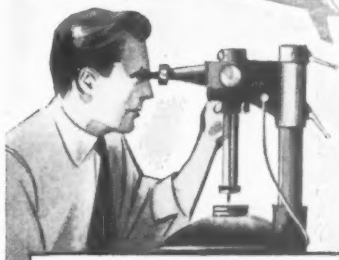
Tennessee Coal & Iron Division, United States Steel Corporation 37, 38, 39, 40, 79
Texaco, Inc. 35
Timken Roller Bearing Co., The, Steel & Tube Division 104
Torit Manufacturing Co. 118

Ulbrich Stainless Steels 175
Union Carbide Corporation, Haynes Stellite Division 119
Union Carbide Corporation, Linde Division 158, 159
Union Carbide Corporation, Union Carbide Metals Division 137
Union Carbide Metals Co., Division of Union Carbide Corporation 137
United States Pipe & Foundry Co., Steel & Tubes Division 30, 31
United States Rubber Co., Mechanical Goods Division 26, 27
United States Steel Corporation, Subsidiaries 28, 29, 37, 38, 39, 40, 79, 134, 135
United States Steel Export Co. 37, 38, 39, 40, 79
United States Steel Supply Division, United States Steel Corporation 37, 40
Urick Foundry Co. 10
U. S. Electrical Motors, Inc. ..... Back Cover

Vanadium Corporation of America 32

Wales Strippit, Inc. 34
Wean Engineering Co., Inc., The 51
West End Chemical Co., Division of Stauffer Chemical Co. 55
Wheland Foundry Division of Gordon Street, Inc., The 160

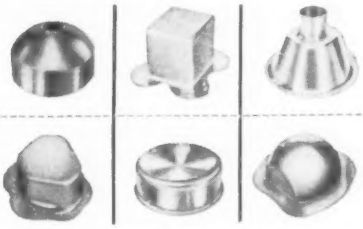
Table of Contents, Page 21
Classified Advertising, Page 195



KAUPP
PRECISION-FORMED
METAL
COMPONENTS

Hydroforming, Deep Drawing and Spinning

You can depend on KAUPP for complete service from design to delivery on precision-made metal parts and sub-assemblies. Ultra modern metal working facilities, plus wide experience on military and commercial requirements are available to solve your problems. Send drawings for quotations or phone for new illustrated bulletins!

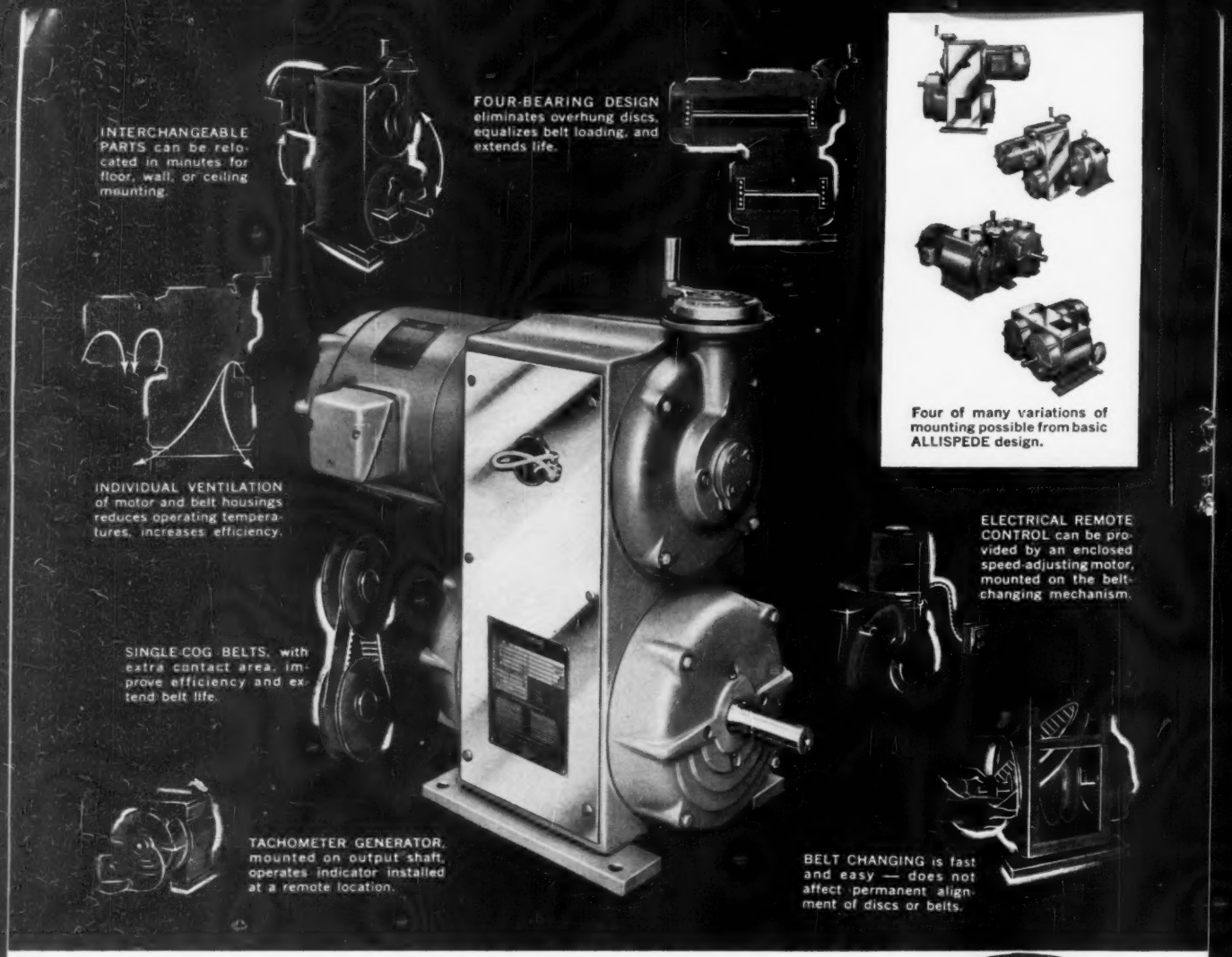


Closest tolerances adhered to in all metals, including MU METAL, BRASS, INCONEL, ALUMINUM, COPPER, CARBON STEEL, STAINLESS STEEL, NICKEL, MAGNESIUM, TITANIUM, SILVER, SPECIAL ALLOYS, HAYNES STELLITE.

C. B. KAUPP & SONS

Newark Way, Maplewood, N. J.—POplar 1-4000

METAL CRAFTSMEN
SINCE 1924


INTERCHANGEABLE PARTS can be relocated in minutes for floor, wall, or ceiling mounting.
FOUR-BEARING DESIGN eliminates overhung discs, equalizes belt loading, and extends life.
Four of many variations of mounting possible from basic ALLISPEDE design.
INDIVIDUAL VENTILATION of motor and belt housings reduces operating temperatures, increases efficiency.
ELECTRICAL REMOTE CONTROL can be provided by an enclosed speed-adjusting motor, mounted on the belt-changing mechanism.
SINGLE-COG BELTS, with extra contact area, improve efficiency and extend belt life.
TACHOMETER GENERATOR, mounted on output shaft, operates indicator installed at a remote location.
BELT CHANGING is fast and easy — does not affect permanent alignment of discs or belts.

Let's look at the features of the ALLISPEDE* Drive

New Louis Allis drive offers accurate control—maximum belt life—long-run economy—low-cost versatility—ease of installation

Here's a drive so easily adaptable to changing physical and operating needs that it obsoletes obsolescence. You can relocate components — add or remove attachments and controls — in the field, in minutes.

Its *all-new* design improves performance and efficiency. Inspection, servicing, and belt-changing are a snap. Furthermore, maintenance is almost nil.

As for versatility — there's an Allispede to meet whatever mechanical drive requirement you have. Sizes up to 30 hp, output speeds from 1 to 10,000 rpm, and speed ranges up to 8:1. Motors can be open, drip-proof, enclosed, or explosion-proof—with ventilated or enclosed belt housings — for foot, P-base, C- or D-flange mounting on your machine.

Allispede is available with parallel shaft, or right-angle, integral speed reducers; special shaft extensions; integral magnetic brakes; electrical or mechanical remote control, and other modifications.

Interested? Contact your nearby Louis Allis District Office or write to The Louis Allis Co., 471 East Stewart Street, Milwaukee 1, Wisconsin, for a copy of Bulletin 3600.

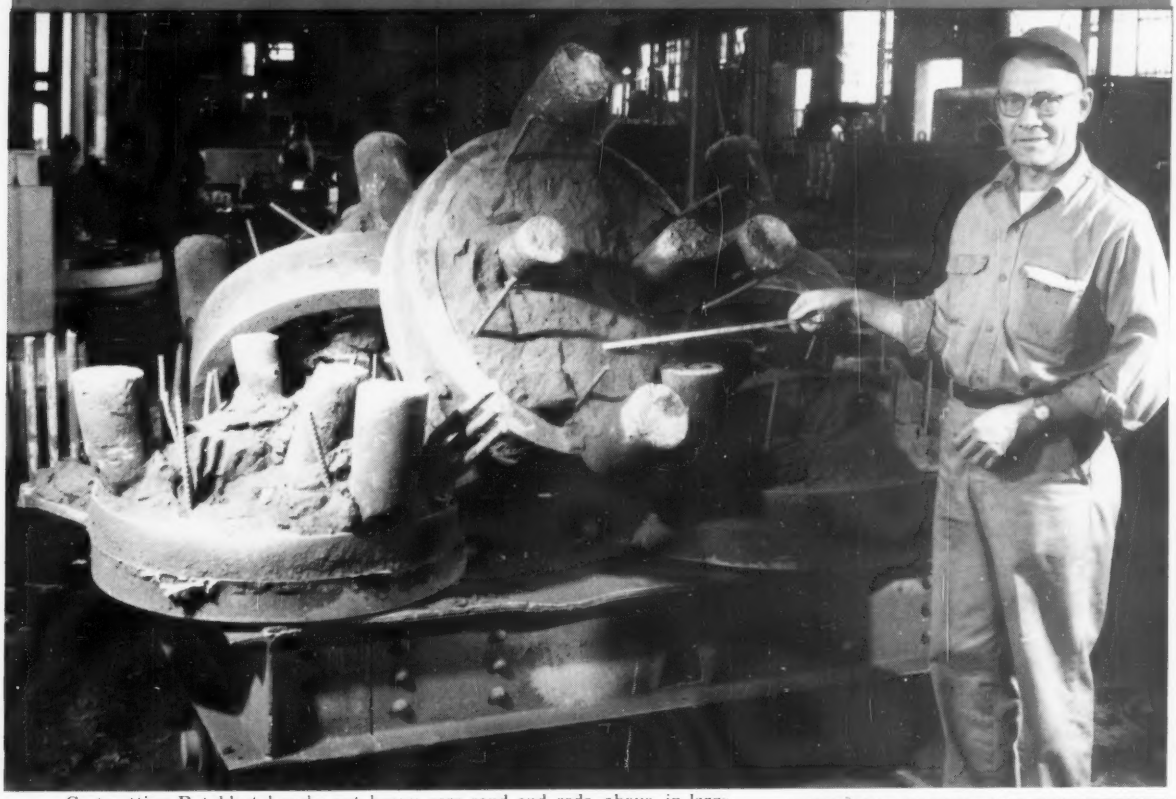
*Allispede is a trademark of The Louis Allis Company.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

ASD-133

New ROTOBLAST saves labor cost of five men



Cost-cutting Rotoblast knocks out heavy core sand and rods, above, in large castings at Elyria Foundry. Inset: cleaned castings are moved to next operation while second table-load is being Rotoblasted.

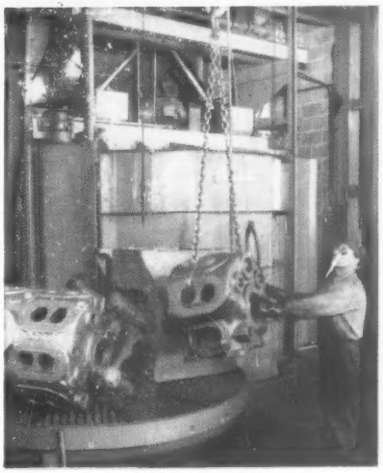
One man and one new ROTOBLAST twin table room do the same amount of blast cleaning work *better* than six men did with previous blast equipment at Elyria Foundry Division, Chromalloy Corporation, Elyria, Ohio. Among extra benefits: new high capacity abrasive separation (equipment on core-knockout ROTOBLASTS) handles core removal right along with blast cleaning, removing a ton of sand an hour from spent abrasive.

Whatever your cleaning needs, a standard or specially designed Rotoblast unit can cut your manpower and operating costs. Full automation can be built in. Easy installation, simple maintenance and fast, thorough cleaning are regular features of Rotoblast.

TRY ROTOBLAST ABRASIVES, TOO!

You can clean castings faster — at lower cost per ton — with solid, tough Rotoblast Steel Shot and Grit. No wonder! The development of this modern abrasive by Pangborn is based on nearly 60 years' experience supplying industry's blast cleaning needs. We'll be glad to go into more detail. Just write:

PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada, Ltd., 47 Shaft Rd., Toronto (Rexdale), Canada; or phone district office in Yellow Pages under "Sand Blast Equipment." *Manufacturers of Blast Cleaning, Vibratory Finishing, Dust and Fume Control Equipment — Rotoblast® Steel Shot and Grit℠.*



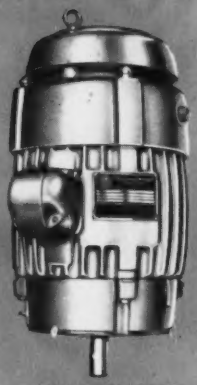
Operation ROTOBLASTING

(BEST IN BLAST CLEANING)

Pangborn

OF HAGERSTOWN

TOTALLY-ENCLOSED*
RIGHT-ANGLE WORM-GEAR
SYNCROGEAR MOTORS



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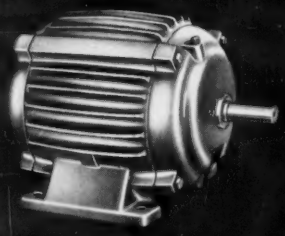

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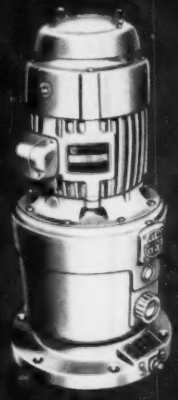
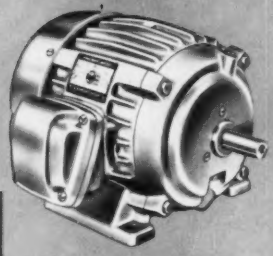
FANLESS TYPE
HORIZONTAL MOTORS



total protection *in every direction*



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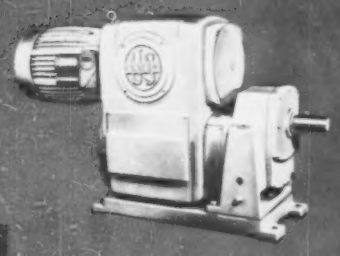
HORIZONTAL MOTORS



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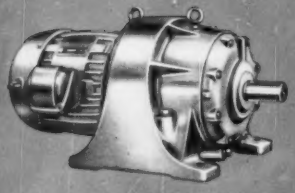

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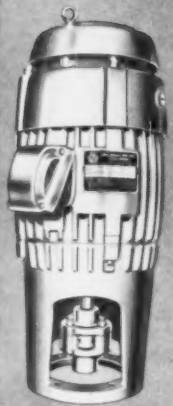
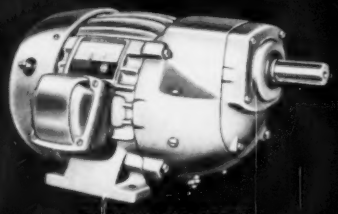
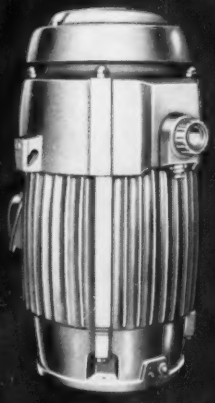
DOUBLE REDUCTION
SYNCROGEAR MOTORS



TOTALLY-ENCLOSED*
UNIBASE VERTICAL
SOLID SHAFT
PUMP MOTORS



TOTALLY-ENCLOSED*
SINGLE REDUCTION
SYNCROGEAR MOTORS



TOTALLY-ENCLOSED*
VERTICAL HOLLOWSHAFT
PUMP MOTORS

*TOTALLY-ENCLOSED and/or EXPLOSION-PROOF U.S. MOTORS

...are offered in a wide range of sizes, horsepowers, speeds... for a multitude of applications. They are offered with and without internal gearing and/or variable speed drives. Like all U.S. Motors, they are *quality* built with *long-life* features such as asbestos-protected windings, normalized castings—and in the grease lubricated models, Lubriflush transverse lubrication. Totally-Enclosed models are intended for use in atmospheres and locations where dirt, rain, oil drippings, acids, alkali, erosive dusts, and similar adverse factors make it desirable to prevent outside air from passing through the motor. Available ½ to 150 H.P. Explosion-Proof motors in corresponding models are offered for highly hazardous locations in which explosive fumes or dusts are present. These motors carry the Underwriters' Label for Class I Group D, and Class II Groups F and G. Bulletins on the above motors are available. *Write to* ...

U.S. ELECTRICAL MOTORS INC.
P. O. Box 2058, Los Angeles, California or Milford, Connecticut